

**SITE-SPECIFIC
HEALTH AND SAFETY PLAN
FOR
BAYONNE BARREL AND DRUM SITE
NEWARK, NEW JERSEY**

Prepared for:

**U.S. Environmental Protection Agency
Region II - Removal Action Branch
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SECTION 1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed for the U. S. Environmental Protection Agency, Bayonne Barrel & Drum Site, Newark, Essex County, New Jersey. This HASP is intended to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous substances. The procedures and guidelines contained herein are based upon the best available information at the time of the plan's preparation. Specific requirements will be revised by the On-Scene Coordinator (OSC) when new information is received or conditions change. Any amendments to this plan will be documented in the Appendix.

All personnel entering the site shall read and sign this safety plan. Protocol set forth herein will remain in effect until the OSC certifies that activity is terminated. It does not supersede any Federal, OSHA, state, or local regulations, but is in addition to them. In the event of a conflict between this protocol and a regulation, the more stringent of the two will be enforced. The protocol is in accordance with, and refers to, the terminology used in the Office of Emergency and Remedial Response (OERR) Standard Operating Safety Guides.

1.1 SITE HISTORY

Bayonne Barrel & Drum (BBD), operated as an unlicensed TSD facility from the early 1940's until the early 1980's when the company filed for bankruptcy under Chapter 11.

According to an EPA Environmental Services Division report from when the facility was in operation drum cleaning operations involved cleaning both closed head and open head drums. In closed head cleaning, the drums were washed with a caustic solution which was drained through an oil-water separator before being discharged to a 50,000 gallon underground storage tank. The liquid was decanted from this tank into the sewer system under a permit from the Passaic Valley Sewerage Commission. The company cleaned the open head drums by use of an incinerator on the site. The residue from this incinerator was collected in two collection pits on either side of the incinerator. Both are approximately 14 feet deep.

There are three vertical storage tanks on site which reportedly contain approximately 1500 gallons of material each. In addition, there are ash piles, contaminated soil piles, piles of tires and a pile of shredded tires with an unknown soil like material under it. Previous sampling at the site has revealed heavy quantities of contaminants throughout the site which range from heavy metals to solvents.

1.2 SCOPE OF WORK

- Site Preparation and security
- Identifying and inventorying of all containers
- Stage and overpack drums and containers, labpack containers less than 5 gallons
- Bulk solid materials
- Drum and container sampling
- Hazard classification
- Remove visible ground contamination
- Transport and dispose of all waste materials, demobilization of the site

SECTION 2.0

KEY PERSONNEL

The USEPA On-Scene Coordinator (OSC), ERCS Program Manager (PM), Response Manager (RM), Certified Industrial Hygienist (CIH), Project Safety Officer (PSO) and TAT representatives share responsibilities for formulating and enforcing health and safety requirements, and implementing the HASP.

2.1 ON-SCENE COORDINATOR (OSC)

The OSC, as the representative of the U.S. Environmental Protection Agency (EPA), is responsible for the overall project administration and coordinating health and safety standards for all individuals on site at all times. All applicable Occupational Health and Safety Administration standards shall be observed. However, each contractor, (as an employer under OSHA) is responsible for the health and safety of its employees.

2.2 TECHNICAL ASSISTANCE TEAM (TAT)

The Technical Assistance Team is responsible for providing the OSC with assistance and support in regard to all technical, regulatory, and safety aspects, of site activity. TAT is also available to advise the OSC on matters related to sampling, treating, packaging, labeling, transporting, and disposing of hazardous materials, but is not limited to that mentioned above.

2.3 PROGRAM MANAGER (ERCS)

The PM has the overall responsibility for the project and to assure that the goals of the construction/remedial action are attained in a manner consistent with the HASP requirements. The PM will coordinate with the SS and the SSO to assure that the remedial action goals are completed in a manner consistent with the HASP. The PM will conduct a monthly health and safety audit of the project using the Management Health and Safety Report Form.

2.4 RESPONSE MANAGER (ERCS)

The RM is responsible for field implementation of the HASP and Site Emergency Response and Contingency Plan. The RM is responsible for field implementation of the HASP. The RM will establish and ensure compliance with site control areas and procedures and coordinate these supervisory responsibilities with the site SSO.

2.5 PROJECT CERTIFIED INDUSTRIAL HYGIENIST (ERCS)

The CIH should be responsible for the contents of the HASP and should ensure that the HASP complies with all federal, state and local health and safety requirements. If necessary, the CIH can modify specific aspect of the HASP to adjust for on-site changes that affect safety. The CIH will coordinate with the PSO on all modifications to the HASP and will be available for consultation when required. The CIH will not necessarily be on site during OHM activities.

2.6 PROJECT SAFETY OFFICER (ERCS)

The PSO's primary responsibilities will be monitoring, including personal and environmental monitoring, conduct safety orientation, and review site safety practices and documentation. The PSO will make periodic visits to the site to fulfill these duties.

2.7 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for personal safety as well as the safety of others in the area. The employee will use all equipment provided in a safe and responsible manner as directed by the RM. All OHM personnel will follow the policies set forth in OHM's Employee Safety Guide and the OHM Health and Safety Procedures.

2.8 RESPONSIBILITIES**2.8.1 On-Scene Coordinator (OSC)**

The National Oil and Hazardous Substance Pollution Contingency Plan (NCP) authorizes the OSC to coordinate and direct federally financed response or clean-up activities at the site. The NCP also makes the OSC responsible for addressing worker safety concerns at the response scene (see 40 CFR 300.135 and .150).

At this hazardous waste site, the primary responsibilities of the OSC relative to safety include the following:

- a. To ensure that all personnel allowed to enter the site (i.e., EPA, TAT, contractors, State, visitors) are aware of the potential hazards associated with substances known or suspected to be on-site;
- b. To ensure that said personnel are aware of the provisions of this plan and are instructed in the safety practices defined in the plan, including its emergency procedures;
- c. To ensure that the appropriate safety equipment is available and properly utilized by all personnel on-site;
- d. To direct the safety monitoring efforts of the Site Safety Monitor; and
- e. To correct any work practices or conditions under his control that may result in exposure to hazardous substances or injury to personnel

The OSC may alter this Health and Safety Plan in writing as warranted by site conditions.

2.8.2 Emergency Response Cleanup Service (ERCS)

The Response Manager (RM), as the field representative for the ERCS cleanup contractor, has the responsibility for fulfilling the terms of the Delivery Order. The RM must oversee the project and ensure that all technical, regulatory, and safety requirements are met. It is the RM's responsibility to communicate with the OSC as frequently as dictated by the OSC, but at least daily, regarding site cleanup progress and any problems encountered.

2.8.3 Technical Assistance Team (TAT)

The Technical Assistance Team is responsible for providing the OSC with assistance and support in regard to all technical, regulatory and safety aspects of site activity, and acting as the Site Health and Safety Monitor as directed by the OSC. TAT is also available to advise the OSC on matters relating to sampling, treating, packaging, labeling, transporting, and disposing of hazardous materials, but is not limited to the above-mentioned activities.

2.9 KEY SAFETY PERSONNEL - PHONE NUMBERS

The following individuals share responsibility for health and safety at the site.

USEPA On-Scene Coordinator
(OSC)/ Site Safety Officer

Joe Cosentino
USEPA Region II
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ERCS Response Manager

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ERCS Project Safety Officer

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TAT Representatives

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ERCS Director,
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800-231-7031

SECTION 3.0 JOB HAZARD ANALYSIS

This section outlines the potential chemical and physical hazards which workers may be exposed to during work on this project. This is a representative list of hazardous materials present at this site. Other chemicals may be present at the site which have not yet been identified. Unless a material is identified by a valid label, it shall be considered as unknown, and handled as such.

3.1 CHEMICAL HAZARDS

| 3.1 CHEMICAL HAZARDS | | | |
|-------------------------|-----------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHEMICAL | EXPOSURE ROUTES | PEL/ TLV | HEALTH HAZARDS/ PHYSICAL HAZARDS |
| 1,2 Dichlorobenzene | Skin, eyes, inhalation, ingestion | 50 PPM | Irritates the respiratory system, mucous membranes, prolonged exposure can cause damage to respiratory system and skin |
| | | | Reacts violently with strong oxidizers, aluminum, acids, chlorides |
| Chromium compounds | skin, inhalation, ingestion | .5 mg/m3 | Prolonged exposure causes contact dermatitis |
| | | | Incompatible with water |
| PCB's | Skin, inhalation | 1 mg/m3 or 0.5mg/m3 (depends on the chlorine %) | Symptoms of exposure include dizziness, irritation of the skin, eyes, and throat, prolonged exposure can cause damage to CNS, kidneys, skin, liver and respiratory system |
| | | | Incompatibles include strong oxidizers |
| 1,1,1, Trichloro-ethane | Skin, eye, inhalation, ingestion | 350 PPM | Headache, dizziness, visual disturbances, tremors, sleepiness, nausea, vomiting, irritation of eyes, dermatitis, cardiac arrhythmia, numbness/tingling of hands, feet, potential carcinogen |
| | | | Reacts with strong acids and bases, metals; flammable liquid |

| 3.1 CHEMICAL HAZARDS | | | |
|-----------------------|----------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| CHEMICAL | EXPOSURE ROUTES | PEL/ TLV | HEALTH HAZARDS/ PHYSICAL HAZARDS |
| Benzene | Skin, eye, inhalation, ingestion | 1 PPM | Irritation of eyes, nose, throat, giddiness, headache, nausea, staggered walking; fatigue, lack of appetite, dermatitis, anemia; a carcinogen |
| | | | Flammable; reacts with strong oxidizers, acids |
| Toluene | Skin, eye, inhalation, ingestion | 100 PPM | Fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, insomnia, numbness/tingling in hands, feet, dermatitis |
| | | | Reacts with strong oxidizers; flammable |
| Ethyl Benzene | Skin, eye, inhalation, ingestion | 100 PPM | Irritation of eyes, nose, throat; headache, dermatitis, dizziness, sleepiness |
| | | | Reacts with strong oxidizers, flammable |
| Xylene | Skin, eye, inhalation, ingestion | 100 PPM | Dizziness, excitement, drowsiness, incoherent, staggering walking; eye, nose, throat irritation; nausea, vomiting, dermatitis |
| | | | Flammable; reacts with strong oxidizers |
| Petroleum Distillates | Skin, eye, inhalation, ingestion | 100 PPM | Mucous membrane irritant; headache, dizziness, euphoria, unconsciousness; a CNS depressant; pulmonary edema from aspiration |
| | | | Reacts violently with oxidizers and oxidizing acids; emits toxic smoke and gas during combustion |
| Naphthalene | Skin, eye, inhalation, ingestion | 10 PPM | Headache, nausea, loss of appetite, confusion excitement; eye damage, jaundice, blood in urine |
| | | | Reacts with strong oxidizers, aluminum salts; emits toxic smoke and gas during combustion |

| 3.1 CHEMICAL HAZARDS | | | |
|----------------------|-------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHEMICAL | EXPOSURE ROUTES | PEL/ TLV | HEALTH HAZARDS/ PHYSICAL HAZARDS |
| Acetone | Skin, Eye, Inhalation, Ingestion | 750 PPM | Narcotic in high concentrations; An irritant to the eyes, nose, throat, and central nervous system causing dizziness, vomiting, headache, and nausea; Defats the skin leading to dermatitis |
| | | | A dangerous fire hazard, keep away from heat, flames, and other sources of ignition; Incompatible with strong oxidizers, strong bases, caustics, chlorine compounds, strong acids, and ammonia |
| Methyl Methacrylate | Inhalation Eyes Skin, Ingestion | 100 PPM | Irritates eyes, skin, nose, throat; can cause problems with upper respiratory system |
| | | | Incompatible with nitrates, oxidizers, strong alkalis, moisture; hazardous polymerization may occur if exposed to incompatible chemicals such as oxidizers or UV light |
| Cadmium | Skin, Inhalation, Ingestion | .2mg/m3 | Incompatible with strong oxidizers and sulfur will irritate the respiratory system. Prolonged exposure will cause damage to the prostate gland, kidneys, and blood. |
| Lead | Skin, inhalation, ingestion | 0.05 mg/m3 | Irritates the respiratory system.; prolonged exposure can cause damage to the GI tract, Central Nervous System, kidneys, liver, blood and skin |
| | | | Incompatible with strong oxidizers, hydrogen peroxide, and acids |

Personnel will be removed from the work site and placed under observation immediately if the following initial symptoms occur:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns

3.2 PHYSICAL HAZARDS

To minimize physical hazards, standard safety protocols will be followed at all times. Failure to follow safety protocols will result in expulsion of the employee from the site. All personnel shall be familiar with the physical hazards presented by each of the tasks they perform. Task specific hazard analyses are provided in Section 3.4. These hazard analysis shall be reviewed prior to beginning each task and periodically throughout the task. It must be noted that these activity hazard analyses are general in nature. It is the responsibility of the RM to nurse them as necessary to reflect site specific conditions.

The RM and SSO will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. Hard hats, safety glasses, and steel-toe safety boots are required in all active work areas of the site.

3.3 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants may pose a hazard when performing outdoor tasks. The SSO and RM will take necessary actions to alleviate these hazards should they arise.

3.3.1 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. Heat stress disorders include:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

Heat stress prevention is outlined in procedure NO. 22 of the OHM Corporation Health and Safety Procedures Manual. This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages; eg. Gatorade. Heat stress can be prevented by assuring an adequate work/rest schedule. Guidelines are presented below.

It is recommended that workers break a minimum of every 2 hours for 10-15 minute rest periods when temperatures exceed 72.5 degrees F and protective clothing is worn. More frequent breaks are necessary as the temperatures and level of protection are increased (see table below).

| AMBIENT TEMPERATURE | LEVEL D PPE | LEVEL C PPE/ MODIFIED LEVEL D |
|---------------------|---------------------------|----------------------------------|
| 90° F or above | After 45 minutes of work | After 15 minutes of work |
| 87.5 F-90 F | After 60 minutes of work | After 30 minutes of work |
| 82.5-87.5 F | After 90 minutes of work | After 60 minutes of work |
| 77.5-82.5 F | After 120 minutes of work | After 90 minutes of work |
| 72.5-77.5 F | After 150 minutes of work | After 120 minutes of work |

A work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. The frequency of monitoring is provided herein.

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, increase the following rest period by 1/3. The initial rest period should be at least 5 minutes.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70 degrees Fahrenheit, when wearing Level C PPE, or 80 degrees Fahrenheit for site activities performed in Level D.

3.3.2 Biological Hazards

- POISON IVY (Rhus Radicans)

Poison Ivy may be found at the site. It is highly recommended that all personnel entering into an area with poison ivy wear a minimum of a tyvek coverall, to avoid skin contact.

The majority of skin reactions following contact with offending plants are allergic in nature and characterized by:

- General symptoms of headache and fever
- Itching
- Redness
- A rash

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may develop a high fever and feel very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed 24 to 48 hours.

Distinguishing Features of Poison Ivy Group Plants

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. Both plants have greenish-white flowers and berries that grow in clusters.

First Aid

- a. Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
- b. Apply calamine or other soothing lotion if rash is mild.
- c. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

• TICKS

Heavily vegetated areas of a site may have ticks. It is highly recommended that all personnel walking through such areas wear a minimum of a tyvek and latex boot covers. The ticks will stand out against the light colors. A tick repellent or insect containing DEET is also recommended.

Ticks can transmit several diseases, including Rocky Mountain spotted fever, a disease that occurs in the eastern portion of the United States as well as the western portion, and Lyme disease. Ticks adhere tenaciously to the skin or scalp. There is some evidence that the longer an infected tick remains attached, the greater is the chance that it will transmit disease.

First Aid

- a. Cover the tick with heavy oil (mineral, salad, or machine) to close its breathing pores. The tick may disengage at once; if not, allow oil to remain in place for a half hour. Carefully (slowly and gently) remove the tick with tweezers, taking care that all parts are removed.
- b. With soap and water, thoroughly, but gently, scrub the area from which the tick has been removed, because disease germs may be present on the skin; also wipe the bite area with an antiseptic. Although use of tweezers for the removal of the tick and application of heat to the tick's body often have been attempted, these methods may leave tick parts in the wound or may injure the skin.
- c. If you have been bitten, place the tick in a jar labeled with the date, location of the bite, and the location acquired. If any symptom appears, such as an expanding red rash, contact a physician immediately.

- **LYME DISEASE**

Lyme disease may cause a number of medical conditions, including arthritis, that can be treated if you recognize the symptoms early and see your doctor. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve and heart problems as well as a disabling type of arthritis.

You are more likely to spot early signs of Lyme disease rather than see the tick or its bite. This is because the tick is so small (about the size of the head of a common pin or a period on this page and a little larger after they fill with blood), you may miss it or signs of a bite. However, it is also easy to miss the early symptoms of Lyme disease.

In its early stage, Lyme disease may be a mild illness with symptoms like the flu. It can include a stiff neck, chills, fever, sore throat, headache, fatigue, and joint pain. But this flu-like illness is usually out of season, commonly happening between May and October when ticks bite.

Most people develop a large, expanding skin rash around the area of the bite. Some people may get more than one rash. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. Its easy to miss the rash and the connection between the rash and the tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be another early sign of Lime disease. These aches and pains may be easy to confuse with the pain that comes from other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

In later stages, Lyme disease may be confused with other medical problems. These problems can develop months to years after the first tick bite.

Early treatment of Lyme disease symptoms with antibiotics can prevent the more serious medical problems of later stages. If you suspect that you have symptoms of Lime disease, contact your doctor.

Lyme disease can cause problems with the nervous system that look like other diseases. These include symptoms of stiff neck, severe headache, and fatigue usually linked to meningitis. They may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease can also mimic symptoms of multiple sclerosis or other types of paralysis.

Lyme disease can also cause serious but reversible heart problems, such as irregular heart beat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Researchers think these more serious problems may be linked to how the body's defence or immune system responds to the infection.

JOB HAZARD ANALYSIS**3.4 TASK-SPECIFIC RISK ASSESSMENT**

| 3.4.1 ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION | | |
|-----------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Clearing/ Grubbing | Struck By/ Against Heavy Equipment | <ul style="list-style-type: none"> • Use reflective warning vests worn when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals |
| | Slips, Trips, Falls | <ul style="list-style-type: none"> • Clear, walkways of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions |
| | Handling Heavy Objects | <ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads |
| | Sharp Objects | <ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use |
| | Insect/ Snake Bites | <ul style="list-style-type: none"> • Review injury potential and types of snakes with workers • Avoid insect nests areas, likely habitats of snakes outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant, wear PPE to protect against sting/bite injuries |
| | Contact Dermatitis | <ul style="list-style-type: none"> • Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants (See Section 5 HASP) • Identify and review poisonous plants with workers |
| | High Noise Levels | <ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) |
| | High Ambient Temperature | <ul style="list-style-type: none"> • Monitor for Heat stress in accordance with OHM Health and Safety Procedures Manual |

JOB HAZARD ANALYSIS

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| 3.4.1 ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION | | |
|-----------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Grading | Struck By/ Against Heavy Equipment | <ul style="list-style-type: none"> • Use reflective warning vests worn when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals |
| | Sharp Objects | <ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use |
| | Insect/ Snake Bites | <ul style="list-style-type: none"> • Review injury potential and types of snakes with workers • Avoid insect nests areas, likely habitats of snakes outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant, wear PPE to protect against sting/bite injuries. |
| | Contact Dermatitis | <ul style="list-style-type: none"> • Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants (See Section 5) • Identify and review poisonous plants with workers |
| | High Noise Levels | <ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) |
| | High Ambient Temperature | <ul style="list-style-type: none"> • Monitor for Heat stress in accordance with OHM Health and Safety Procedures Manual |
| Equipment/ Facility Set-up | Slips, Trips, Falls | <ul style="list-style-type: none"> • Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions |
| | Handling Heavy Objects | <ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads |

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OHM Project 16441HS
Bayonne Barrel and Drum Site

JOB HAZARD ANALYSIS

July 21, 1994

Revision No. 0

| 3.4.1 ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION | | |
|-----------------------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Equipment/ Facility Set-up (Continued) | Sharp Objects | <ul style="list-style-type: none">• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects• Maintain all hand and power tools in a safe condition• Keep guards in place during use |
| | High Noise Levels | <ul style="list-style-type: none">• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) |
| | High Ambient Temperature | <ul style="list-style-type: none">• Monitor for Heat stress in accordance with OHM Health and Safety Procedures Manual |

JOB HAZARD ANALYSIS

July 21, 1994

Revision No. 0

| 3.4.2 ACTIVITY HAZARD ANALYSIS FOR DEBRIS STAGING AND REMOVAL | | |
|---------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Debris Removal, Staging | Struck by, Against Debris, Protruding Objects, Splashes | <ul style="list-style-type: none">• Restrict entry to the work area to authorized personnel only• Wear hard hats, face shields, and steel-toe safety boots• Place adequate, safe lighting in Process and Cooker building work areas• Position lighting for specific tasks• Remove dangling, weak overhead obstructions |
| | Slips, Trips, Falls | <ul style="list-style-type: none">• Clear walkways, work areas of equipment, tools, and debris materials• Mark, identify, or barricade other obstructions• Repair or barricade unsafe stairwells, elevated walkways• Apply oil-dry/sand to slippery work surfaces• Place adequate, safe lighting in work areas, stairways• Position lighting for specific tasks |
| | Handling Heavy Objects | <ul style="list-style-type: none">• Observe proper lifting techniques• Obey sensible lifting limits (60 lb. maximum for manual lifting)• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads |
| | Sharp Objects | <ul style="list-style-type: none">• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects• Maintain all hand and power tools in a safe condition• Keep guards in place during use |
| | High Noise Levels | <ul style="list-style-type: none">• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) |
| | Burns | <ul style="list-style-type: none">• Use proper work gloves, face shield/safety goggles, and leather apron to protect workers from skin burns when welding, cutting, and burning |
| | Inhalation and Contact with Hazardous Substances | <ul style="list-style-type: none">• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (Section 5.0)• Review contaminant chemical MSDSs with workers before operations begin |

| 3.4.2 ACTIVITY HAZARD ANALYSIS FOR DEBRIS STAGING AND REMOVAL | | |
|---------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Debris Removal, Staging (Continued) | Caught In/ Between Moving Parts, Objects | <ul style="list-style-type: none"> • Provide and use proper work gloves when the possibility of crush, pinch, or other injury may be caused by moving/stationary edges or objects • Maintain all equipment in a safe condition • Keep all guards in place during use • De-energize and lock-out machinery before maintenance or service |

JOB HAZARD ANALYSIS

July 21, 1994

Revision No. 0

| 3.4.3 ACTIVITY HAZARD ANALYSIS FOR DRUM AND CYLINDER HANDLING | | |
|---------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Staging/ Overpacking Drums and Cylinders | Handling Heavy Objects | <ul style="list-style-type: none">• Observe proper lifting techniques• Obey sensible lifting limits (60 lb. maximum for manual lifting)• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads |
| | Slips, Trips, Falls | <ul style="list-style-type: none">• Clear walkways, work areas of equipment, tools, and debris• Mark, identify, or barricade other obstructions |
| | Caught In/ Between Moving Parts, Objects | <ul style="list-style-type: none">• Provide and use proper work gloves when the possibility of crush, pinch, or other injury may be caused by moving/stationary edges or objects• Maintain all equipment in a safe condition• Keep all guards in place during use• De-energize and lock-out machinery before maintenance or service |
| | Fire/ Explosion | <ul style="list-style-type: none">• Test atmosphere with combustible gas meter• Eliminate sources of ignition from the work area• Smoking is prohibited• Provide ABC (or equivalent) fire extinguishers in all work and flammable storage areas• Store flammable liquids in well ventilated areas• Post "NO SMOKING" signs• Store combustible materials away from flammables• Store, all compressed gas cylinders upright, caps in place when not in use• Separate Flammables and Oxidizers by 20 feet |
| | Sharp Objects | <ul style="list-style-type: none">• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects• Maintain all hand and power tools in a safe condition• Keep guards in place during use |

| 3.4.3 ACTIVITY HAZARD ANALYSIS FOR DRUM AND CYLINDER HANDLING | | |
|---------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| | Struck by, Against Heavy Equipment, Protruding Objects | <ul style="list-style-type: none"> • Use reflective warning vests worn when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review posted hand signals |
| | Inhalation and Contact with Hazardous Substances | <ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (Section 5.0) • Review contaminant chemical MSDSs with workers before operations begin |
| | High Ambient Temperature | <ul style="list-style-type: none"> • Monitor for heat in accordance with OHM Health and Safety Procedures Manual |

| 3.4.4 ACTIVITY HAZARD ANALYSIS FOR CONTAINER SAMPLING, INVENTORY | | |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Container Sampling, inventory | Sharp Objects | <ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use |
| | Handling Heavy Objects | <ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum for manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move drums/containers |
| | Slips, Trips, Falls | <ul style="list-style-type: none"> • Clear walkways, work areas of equipment, tools, and debris • Mark, identify, or barricade other obstructions |
| | Inhalation and Contact with Hazardous Substances (deteriorated drums; leaking chemicals) | <ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (Section 5.0) • Review contaminant chemical MSDSs with workers before operations begin • Use buddy system during inventory • Inspect condition of drums before marking or sampling • Inspect for signs of leaking chemicals • Provide spill response materials and equipment (Section 8.0) • Use remote opening procedures/equipment for pressurized drums • Do not stand on drums |
| | High Ambient Temperature | <ul style="list-style-type: none"> • Monitor for heat stress in accordance with OHM Health and Safety Procedures Manual |

| 3.4.5 ACTIVITY HAZARD ANALYSIS FOR LAB PACKING AND CRUSHING UNKNOWNNS | | |
|-----------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Labpacking Drums | Handling Heavy Objects | <ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum for manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move drums/containers |
| | Slips, Trips, Falls | <ul style="list-style-type: none"> • Clear, walkways of equipment, tools and other debris • Mark, identify, or barricade other obstructions |
| | Fire/ Explosion | <ul style="list-style-type: none"> • Test atmosphere with combustible gas meter • Eliminate sources of ignition from the work area • Smoking is prohibited • Provide ABC (or equivalent) fire extinguishers in all work and flammable storage areas • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store, all compressed gas cylinders upright, caps in place when not in use • Separate Flammables and Oxidizers by 20 feet |
| | Sharp Objects | <ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use |
| | Struck by/Against Equipment, Protruding Objects | <ul style="list-style-type: none"> • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Wear hard hats and steel-toe safety boots • Understand and review posted hand signals |
| | Inhalation and Contact with Hazardous Substances | <ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (Section 5.0) • Review contaminant chemical MSDSs with workers before operations begin |

| 3.4.5 ACTIVITY HAZARD ANALYSIS FOR LAB PACKING AND CRUSHING UNKNOWNNS | | |
|-----------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| Labpacking Drums (Continued) | High Ambient Temperature | <ul style="list-style-type: none"> • Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual |
| Crushing Unknownns | Struck by/Against Heavy Equipment, Flying Debris | <ul style="list-style-type: none"> • Use reflective warning vests when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the crushing area • Restrict entry to the work area to authorized personnel during crushing activities • Wear hard hats, safety glasses with side shields, and steel-toe safety boots • Understand and review posted hand signals |
| | Inhalation and Contact with Hazardous Substances | <ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (Section 5.0) • Review contaminant chemical MSDSs with workers before operations begin |
| | Fire/ Explosion | <ul style="list-style-type: none"> • Test atmosphere with combustible gas meter • Eliminate sources of ignition from the work area • Prohibit Smoking • Provide ABC (or equivalent) fire extinguishers during crushing activities • Post "NO SMOKING" signs • Store combustible materials away from flammables |

| 3.4.6 ACTIVITY HAZARD ANALYSIS FOR HAZCAT ACTIVITIES | | |
|------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TASK BREAKDOWN | POTENTIAL HAZARDS | HAZARD CONTROL MEASURES |
| HAZCAT Testing | Inhalation and Contact with Hazardous Substances | <ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (Section 5.0) • Review contaminant chemical MSDSs with workers before operations begin |
| | Fire/ Explosion | <ul style="list-style-type: none"> • Follow all procedures as provided in the current edition of OHM Compatibility Testing Manual • Use required equipment for testing materials as required by the current edition of OHM Compatibility Testing Manual • Use only 5g sample for compatibility testing • Oxidizer and metals compounds are very reactive materials; it is recommended that these materials not be compatibility tested when field analytical data is not available • Keep samples and drums out of direct sunlight and heat • Conduct hazcat testing within lab fume hood • Test atmosphere with combustible gas meter • Eliminate sources of ignition from the work area • Prohibit smoking in HAZCAT work area • Provide ABC (or equivalent) fire extinguishers in all work areas • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Separate Hazard class materials by compatible groups |
| | Slips, Trips, Falls | <ul style="list-style-type: none"> • Clear walkways of equipment, tools, and stored materials • Maintain housekeeping in HAZCAT work area |
| | Sharp Objects | <ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use |
| | High Ambient Temperature | <ul style="list-style-type: none"> • Monitor for Heat stress in accordance with OHM Health and Safety Procedures Manual |

SECTION 4.0

WORK AND SUPPORT AREAS

To prevent migration of contamination caused through tracking by personnel or equipment, work areas and personal protective equipment will be clearly specified prior to beginning operations. Each work area will be divided as suggested by the NIOSH/OSHA/USCG/EPA'S document titled, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities."

- An Exclusion or "hot" Zone (EZ)
- A Contamination-Reduction Zone (CRZ)
- A Support Zone (SZ)

4.1 EXCLUSION ZONE

The EZ is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks and monitoring performed within that zone. The EZ for this project will be the interior of the process building, cooker building, and the warehouse buildings. Also the grounds areas where suspected or identified contaminants are stored.

4.2 CONTAMINATION-REDUCTION ZONE

The CRZ or transition zone will be established between the EZ and SZ. In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ. The CRZ for this project will be the accessway to the various building interiors and the immediate areas surrounding the outside contaminant storage locations.

4.3 SUPPORT ZONE

The SZ serves as a clean, control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment, or clothing will not be allowed in the SZ. The support facilities should be located upwind of site activities. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the SSO and the RM to ensure proper safety protocols are followed. The SZ will be the crew trailer, office trailers and the parking and visitor accessways to the project site.

4.4 GENERAL

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contamination is prohibited in the EZ and CRZs.

- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking or other activities which may result in ingestion of contamination.
- A buddy system will be used. Hand signals will be established to maintain communication.
- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance. All personnel will be aware of dangerous situations that may develop.
- Visual contact will be maintained between buddies on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SSO or the RM, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site.

SECTION 5.0 PROTECTIVE EQUIPMENT

This section addresses the various levels of personal protective equipment (PPE) to be used at this job site.

5.1 ANTICIPATED PROTECTION LEVELS

| <i>TASK</i> | <i>PROTECTION LEVEL</i> | <i>COMMENTS/MODIFICATIONS</i> |
|-------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stage/overpack drums, containers; sampling, inventory | Level B | Saranex coated Tyvek coveralls |
| Wastestream bulking, sampling unknowns | Level B | Saranex coated Tyvek coveralls |
| Nonhazardous debris removal | Level C/B | Level B if other level B activities are progressing in same area |
| HAZCAT | Level D | Level D if performed within lab fume hood; higher level of protection required if lab fume hood is not used; safety goggles/face shielding; nitrile gloves |
| CRZ Workers | Level D+ /C | Level C if level B activities are in use in the exclusion zone |
| SZ Workers | Level D | |

5.2 PROTECTION LEVEL DESCRIPTIONS

This sections lists the minimum requirements for each protection level. Modification to these requirements will be noted above.

5.2.1 Level D

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather

5.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, PVC, or latex booties
- Outer nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)
- Tyvek coverall [Saranex Tyveks (Sarans) for handling liquids]

5.2.3 Level C

Level C consists of the following:

- Full-face, air-purifying respirator with GMC-H cartridges
- Hooded Tyvek coveralls and Saranex Tyveks (Sarans)
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, or latex overboots
- Nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)

5.2.4 Level B

Level B protection consists of the items required for Level C protection with the exception that a supplied air respirator is used in place of the air-purifying respirator.

5.2.5 Level A

Level A protection consists of the items required for Level B protection with the addition of a fully-encapsulating, vapor-proof suit capable of maintaining positive pressure.

5.3 SUPPLIED-AIR RESPIRATORS

If air monitoring shows that Level B protection is needed, personnel will wear Airline respirators with 5-minute egress bottles. Personnel requiring Level "B" protection and high mobility will wear SCBA units.

5.4 BREATHING-AIR QUALITY

Code of Federal Regulations 29 CFR 1910.134 states breathing air will meet the requirement for Grade D breathing air as described in the ANSI/CGA Specification G-7.1-1989. A certificate of analysis from vendors of breathing air shall be obtained in order to show that the air meets this standard.

5.5 AIR-PURIFYING RESPIRATORS

A NIOSH approved full face respirator with appropriate air purifying cartridges will be used for level C work.

5.6 RESPIRATOR CARTRIDGES

The crew members working in Level C will wear respirators equipped with approval for the following contaminants:

- Organic vapors < 1,000 ppm
- Chlorine gas < 10 ppm
- Hydrogen chloride < 50 ppm
- Sulfur dioxide < 50 ppm
- Dusts, fumes and mists with a TWA < 0.05 mg/m³
- Asbestos-containing dusts and mists
- Radionuclides

5.7 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once daily or more frequently if personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property. Cartridges will be labeled with the date service began.

5.8 INSPECTION AND CLEANING

Respirators will be checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after use.

5.9 FIT TESTING

Annual respirator fit tests are required of all personnel wearing negative-pressure respirators. The test will use isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used.

5.10 FACIAL HAIR

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

5.11 CORRECTIVE LENSES

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

5.12 CONTACT LENSES

Contact lenses will not be worn with any type of respirator.

5.13 MEDICAL CERTIFICATION

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees shall receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

5.14 SITE-SPECIFIC RESPIRATORY PROTECTION PROGRAM

The primary objective of respiratory protection is to prevent atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need have been evaluated and are contained in Section 7.0 of this HASP; anticipated levels of respiratory protection are given in section 5.1. All site personnel will be trained in proper respirator use and maintenance. The RM and SSO will observe workers during respirator use for signs of stress and will monitor air levels of contaminants to ensure that respiratory protection is sufficient. The RM, CIH, and SSO will evaluate this HASP periodically to determine its continued effectiveness.

All respirators and cartridges used will provide adequate protection against the hazards for which they were designed in accordance with applicable standards. All persons assigned to use respirators will have medical clearance to do so.

SECTION 6.0

DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

6.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

1. Go to end of EZ
2. Wash outer boots and gloves in detergent solution
3. Rinse outer boots and gloves in water
4. Remove outer boots and let dry
5. Remove outer gloves and let dry
6. Cross into CRZ
7. Wash splash suit
8. Rinse splash suit
9. Remove splash suit and let dry
10. Remove Saranex Tyvek suit and discard
11. Remove sample gloves and discard
12. Remove and wash respirator
13. Rinse respirator and hang to dry
14. Remove sample gloves and discard
15. Remove Tyvek and discard
16. Remove booties and discard
17. Remove sample gloves and discard

6.1.1 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided as determined by the degree of injury.

6.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

6.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the SSO.

6.3 DISPOSAL

All decontamination liquids and disposable clothing will be treated as contaminated waste unless determined otherwise by accepted testing methods. Wastes will be disposed according to state and federal regulations.

SECTION 7.0 AIR MONITORING

Air monitoring will be conducted in order to determine airborne contamination levels. This ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered. The following air monitoring efforts will be used at this site. Additional air monitoring may be conducted at the discretion of the OSC.

The following chart describes the air monitoring required and appropriate action levels.

| <i>Monitoring Device</i> | <i>Action Level</i> | <i>Action</i> |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| LEL/O ₂ | > 10% LEL < 20.8% O ₂ | Evacuate area, ventilate, upgrade to Level B if necessary, continue to monitor |
| PID | 0-5 ppm unknowns | Level C |
| | 5-500 ppm unknowns | Level B |
| | > 500 ppm unknowns | Level A |
| Miniram | 0-1 mg/m ³ | Level D |
| | 1-10 mg/m ³ | Level C |
| | greater than 10 mg/m ³ | Level B |
| Radiation meter | Greater than 3 times background and less than 1 Mr/hr, proceed with caution; consult health physicist. Greater than 1 Mr/hr, leave immediate area of source. Work may continue under the direction of a health physicist. | |

7.1 LOWER EXPLOSIVE LIMIT/OXYGEN (LEL/O₂) METER

Prior to entering a confined-space area or hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL/O₂ measurements will be taken.

7.2 PHOTOIONIZATION DETECTOR (PID)

A PID will be used to monitor total ionizable organic content of the ambient air. A PID will prove useful as a direct reading instrument to aid in determining if respiratory protection needs to be upgraded and to define the EZ. The SSO will take measurements before operations begin in an area to determine the amount of organic compounds naturally occurring in the air. This is referred to as a background level.

Levels of volatile organic compounds will be measured in the air at active work sites once every hour and at the support zone once every hour when levels are detected above background in the exclusion zone. If levels exceed background at any time in the support zone, work in the exclusion zone will cease and corrective actions will be taken.

Work will not resume until levels reach background in the support zone. Readings will also be taken should activities begin in an area not previously monitored or if a different operation than those previously accomplished is begun.

The miniram will be used to monitor dusts during work in the areas contaminated with the ash. The instrument(s) will be zeroed each morning and the results of the day's monitoring will be recorded in the air monitoring log (see below).

7.3 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include instrument used, wind direction, work process, etc. The OHM project CIH will periodically review this data.

7.4 CALIBRATION REQUIREMENTS

The PID, LEL/O₂ meter and sampling pumps required with fixed-media air sampling will be calibrated daily prior to use. A separate log will be kept detailing date, time, span gas, or other standard, and name of person performing the calibration.

7.5 AIR MONITORING RESULTS

Air monitoring results will be posted for personnel inspection, and will be discussed during morning safety meetings.

SECTION 8.0

EMERGENCY RESPONSE

8.1 PRE-EMERGENCY PLANNING

Prior to engaging in construction/remediation activities at the site, the RM will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition site personnel will receive training during the site orientation concerning proper emergency response procedures.

The following situations would warrant implementation of the emergency plan:

| | |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fire/Explosion | <ul style="list-style-type: none">• The potential for human injury exists.• Toxic fumes or vapors are released.• The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions.• The use of water and/or chemical fire suppressants could result in contaminated run-off.• An imminent danger of explosion exists. |
| Spill or Release of Hazardous Materials | <ul style="list-style-type: none">• The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.• The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health. |
| Natural Disaster | <ul style="list-style-type: none">• A rain storm exceeds the flash flood level.• The facility is in a projected tornado path or a tornado has damaged facility property.• Severe wind gusts are forecasted or have occurred and have caused damage to the facility. |
| Medical Emergency | <ul style="list-style-type: none">• Overexposure to hazardous materials.• Trauma injuries (broken bones, severe lacerations/bleeding, burns).• Eye/skin contact with hazardous materials.• Loss of consciousness.• Heat stress (Heat stroke).• Cold stress (Hypothermia).• Heart attack.• Respiratory failure.• Allergic reaction. |

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.
- On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.
- It will be the responsibility of the emergency coordinator to brief the on-site response team on anticipated hazards at the site. The emergency coordinator shall also be responsible for anticipating and requesting equipment that will be needed for response activities.
- Emergency response activities will be coordinated with the Local Emergency Planning Committee (LEPC) in compliance with SARA Title III requirements.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The primary communication device will be two-way radios. Air horns may be used to alert personnel of emergency conditions. A telephone will be located at the command post to summon assistance in an emergency.

Primary communication with local responders in the event of an emergency will be accomplished using commercial telephone lines.

8.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the RM and Site Safety Officer (SSO), through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and activity hazard analyses) to recognize and identify all hazards that are found at the site. These may include:

| | |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chemical Hazards | <ul style="list-style-type: none">• Materials at the site• Materials brought to the site |
| Physical Hazards | <ul style="list-style-type: none">• Fire/explosion• Slip/trip/fall• Electrocution• Confined space• IDLH atmospheres• Excessive noise |

| | |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mechanical Hazards | <ul style="list-style-type: none">• Heavy equipment• Stored energy system• Pinch points• Electrical equipment• Vehicle traffic |
| Environmental Hazards | <ul style="list-style-type: none">• Electrical Storms• High winds• Heavy Rain/Snow• Temperature Extremes (Heat/Cold Stress)• Poisonous Plants/Animals |

Once a hazard has been recognized, the RM and/or the SSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Lock-out/tag-out
- Personal Protective Equipment (PPE) selection/use
- Written and approved permits for hot work, confined space
- Trenching/shoring procedure
- Air monitoring
- Following all OHM standard operating procedures
- Practice drills for fire, medical emergency, and hazardous substances spills

TABLE 8.1
EMERGENCY TELEPHONE NUMBERS

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <u>Local Agencies</u> -- Newark, New Jersey | |
| Fire Department | 201-733-7491 |
| Police | 201-733-6245 |
| Hospital -- St. James Hospital | 201-589-1300 |
| Make a left out of the site and get onto Raymond Blvd. Make a left onto Market Street. Follow Market for four blocks and make a right onto Jackson St. Follow Jackson St. to Lafayette St. The hospital entrance is on the left. | |
| Regional Poison Control Center | 800-552-6337 |
| <u>State Agencies</u> | |
| NJDEPE Emergency Response | 609-727-7172 |
| <u>Federal Agencies</u> | |
| EPA Region Branch Response Center | 1-800-424-8802 |
| Agency for Toxic Substances and Disease Registry | 404-639-0615 (24 HR) |
| U.S. Coast Guard | 804-484-8192 |
| National Response Center | 800-424-8802 |
| Project Manager Tom O'Hara | 609-588-6395 |
| Director, Health and Safety | |
| Kevin McMahon | 609-588-6375 |
| OHM Corporation (24 hour) | 800-537-9540 |
| Additional Phone #'s in Section 2 this HASP | |

8.3 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary emergency coordinator for this site is the OSC. In the event an emergency occurs and the emergency coordinator is not on site, the RM will serve as the emergency coordinator until he arrives. The emergency coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The emergency coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment.

Immediately after being notified of an emergency incident, the emergency coordinator or his designee will evaluate the situation to determine the appropriate action.

8.3.1 Responsibilities and Duties

This section describes the responsibilities and duties assigned to the emergency coordinator.

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. Personnel will follow procedures as directed by the fire department, LEPC, State and Federal Agencies as required. The OSC, in coordination with the local Fire Department chief will assume the role of Incident Commander. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

8.3.2 On-site Emergency Coordinator Duties

The on-site emergency coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the emergency coordinator. Specific duties are as follows:

- Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.
- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, where appropriate.
- Notify local Emergency Response Teams if their help is necessary to control the incident. Table 8.1 provides telephone numbers for emergency assistance.
- Direct on-site personnel to control the incident until, if necessary, outside help arrives. Specifically:
 - Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if appropriate. The Emergency Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.
- If fire or explosion is involved, notify local Fire Department.
- Have protected personnel, in appropriate PPE, on standby for rescue.

If the incident may threaten human health or the environment outside of the site, the emergency coordinator should immediately determine whether evacuation of area outside of the site may be necessary and, if so, notify the Police Department and the Office of Emergency Management.

When required, notify the National Response Center. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800-424-8802.

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.
- Containers of waste are removed or isolated from the immediate site of the emergency.
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.
- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.
- Notify the USEPA Regional Administrator that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility. The USEPA Regional Administrator's telephone number is included in the Emergency Contacts.
- Record time, date, and details of the incident, and submit a written report to the USEPA Regional Administrator. Report is due to USEPA within 15 days of the incident.

8.4 SAFE DISTANCES AND PLACES OF REFUGE

The emergency coordinator for all activities will be the OSC. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by their foremen and to await further instruction.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The emergency coordinator, or his designee will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 8.1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the crew trailers, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

8.5 EVACUATION ROUTES AND PROCEDURES

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the emergency coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The emergency coordinator is responsible for determining which situations require site evacuation.

8.5.1 Evacuation Signals and Routes

Two-way radio communication and an air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. Each crew supervisor will have a two way radio. A base station will be installed in the OHM office trailer to monitor for emergencies. Total site evacuation will be initiated only by the emergency coordinator, however, in his absence, decision to preserve the health and safety of employees will take precedence. Evacuation routes will be posted in each outside work area. Signs inside buildings will be posted on walls or other structural element of a building. Periodic drills will be conducted to familiarize each employee with the proper routes and procedures.

8.5.2 Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the emergency coordinator.
- ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the emergency coordinator.

- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- A final tally of persons will be made by the emergency coordinator or designee. No attempt to find persons not accounted for will involve endangering lives of OHM or other employees by re-entry into emergency areas.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the Site Supervisor. The security guard will aid in accounting for visitors, contractors, and truckers by reference to sign-in sheets available from the guard shack.
- Personnel will be assigned by the emergency coordinator to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance is given by the emergency coordinator. At his direction, a signal or other notification will be given for re-entry into the facility.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

8.6 EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 8.1 provide a quick reference guide to follow in the event of a major spill.

8.6.1 Notification Procedures

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site emergency coordinator.

On-site Emergency Coordinator will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release or spillage of hazardous material.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapor or smoke release is heading.
- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site emergency coordinator to assess the magnitude and potential seriousness of the spill or release.

8.6.2 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 ft. in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 ft. in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be enforced. In general an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site emergency coordinator will inform the proper agencies in the event this is necessary. (Refer to Table 8.1)

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA shall be reported.

Clean up personnel will take the following measures:

- Make sure all unnecessary persons are removed from the hazard area.
- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.

- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
- Spray the spill area with foam, if available, if volatile emissions may occur.
- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.
- For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

8.6.3 Emergency Response Equipment

The following equipment will be staged in the support zone and throughout the site, as needed, to provide for safety and first aid during emergency responses.

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Eyewash/safety shower
- Emergency oxygen unit
- Emergency signal horn
- Self contained breathing apparatus (two)
- Stretcher/backboard

In addition to the equipment listed above, OHM maintains direct reading instrumentation that may be used in emergency situations to assess the degree of environmental hazard. This equipment will only be used by the Site Safety Officer or other specially trained personnel. This equipment will be stored, charged and ready for immediate use in evaluating hazardous chemical concentrations. The equipment will be located at the OHM office trailer.

| EQUIPMENT NAME | APPLICATION |
|--------------------------------------|---------------------------------------------------------------------|
| Portable Photoionization Meter | Measures selected inorganic and organic chemical concentrations |
| MSA Oxygen and Combustible Gas Meter | Measures oxygen and combustible gas levels |
| Draeger Detector Tubes | Assorted detector tubes to measure specific chemical concentrations |

8.6.4 Personal Protective Equipment

A supply of two (minimum) SCBAs will be located in the support zone for use in emergency response to hazardous materials releases. They will be inspected at least monthly, according to OSHA requirements. In addition, all emergency response personnel will have respirators available for use with cartridge selection determined by the Site Safety Officer based on the results of direct reading instruments. Emergency response personnel will also be provided with protective clothing as warranted by the nature of the hazardous material and as directed by the Site Safety Officer.

8.6.5 Emergency Spill Response Clean-Up Materials and Equipment

A sufficient supply of appropriate emergency response clean-up and personal protective equipment will be inventoried and inspected, visually, on a weekly basis.

The materials listed below will be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the support zone, in a supply trailer or storage area. Small amounts will be placed on pallets and located in the active work areas.

- Sand or clay to solidify/absorb liquid spills.
- Lime (calcium oxide), soda ash (sodium carbonate), or baking soda (sodium bicarbonate) for neutralizing acid (pH <7) spills.
- Activated charcoal (carbon) to adsorb organic solvents (hydrocarbons) and to reduce flammable vapors.
- Citric acid for neutralizing caustic (pH >7) spills.
- Vapor-suppressing foam, if required by the Client, for controlling the release of volatile organic compounds.
- Appropriate solvents e.g. CITRIKLEEN, for decontamination of structures or equipment.

The following equipment will be kept on site and dedicated for spill cleanup:

- Plastic shovels for recovering corrosive and flammable materials.
- Sausage-shaped absorbent booms for diking liquid spills, drains, or sewers.
- Sorbent sheets (diapers) for absorbing liquid spills.
- Overpack drums for containerizing leaking drums.
- 55-gallon open-top drums for containerization of waste materials.

***NOTE:** All contaminated soils, absorbent materials, solvents and other materials resulting from the clean-up of spilled or discharged substances shall be properly stored, labelled, and disposed of off-site.

8.7 EMERGENCY CONTINGENCY PLAN

This section of the ERCP details the contingency measures OHM will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

8.8 MEDICAL EMERGENCY CONTINGENCY MEASURES

The procedures listed below will be used to respond to medical emergencies. The SSO will contact the local hospital and inform them of the site hazards and potential emergency situations. A minimum of two First-Aid/CPR trained personnel will be maintained on site.

8.8.1 Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site emergency coordinator to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the emergency, if known

The Emergency Coordinator will notify the Site Safety Officer. The following actions will then be taken depending on the severity of the incident:

- Life-Threatening Incident -- If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. Any injury within the EZ will be evacuated by OHM personnel to a clean area for treatment by (EMS) personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.
- Non Life-Threatening Incident -- If it is determined that no threat to life is present, the Site Safety Officer will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

***NOTE:** The area surrounding an accident site must not be disturbed until the scene has been cleared by the Site Safety Officer.

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- Alert emergency and off-site medical personnel to potential contamination, instruct them about specific decontamination procedures.
- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

All injuries, no matter how small, will be reported to the SSO or the RM. An accident/injury/illness report will be completely and properly filled out and submitted to the OSC and Regional Health and Safety Director/Project CIH, (OHM only).

A list of emergency telephone numbers is given in Table 8.1.

8.8.2 Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-site Emergency Coordinator
- Workers in the affected areas
- Client Representative

8.8.3 Directions To Hospital

Written directions to the hospital and a map will be posted in all trailers in the staging area. Directions to the hospital are stated above.

8.9 FIRE CONTINGENCY MEASURES

Because flammable/combustible materials are present at this site, fire is an ever-present hazard. OHM personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the emergency coordinator by radio and vacate the structure or area. The emergency coordinator will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.
- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

8.9.1 Response

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify their supervisor who will then contact the Emergency Coordinator by radio. The emergency coordinator will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a small fire has been extinguished by a worker, the emergency coordinator will be notified.

8.10 HAZARDOUS WEATHER CONTINGENCY MEASURES

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy Rains/Snow
- High Winds

8.10.1 Response

- Excavation/soil stock piles will be covered with plastic liner.
- All equipment will be shut down and secured to prevent damage.
- Personnel will be moved to safe refuge, initially crew trailers. The emergency coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

8.10.2 Notification

The emergency coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- OHM employees and subcontractors
- Client Representative
- Local Civil Defense Organization

8.11 SPILL/RELEASE CONTINGENCY MEASURES

In the event of release or spill of a hazardous material the following measures will be taken:

8.11.1 Response

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

First aid will be administered to injured/contaminated personnel. Unsuspecting persons/vehicles will be warned of the hazard. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve or temporarily sealing a hole with a plug.

Utilizing radio communications, the emergency coordinator will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Air monitoring will be implemented by the emergency coordinator and SSO to determine the potential impact on the surrounding community. Notification procedures will be followed to inform on-site personnel and off-site agencies. The emergency coordinator will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- construction of a temporary containment berm utilizing on-site clay absorbent earth
- digging a sump, installing a polyethylene liner and
- diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- transferring the material from its original container to another container

The emergency coordinator will notify the Client Representative of the spill and steps taken to institute clean-up. Emergency response personnel will clean-up all spills following the spill clean-up plan developed by the emergency coordinator. Supplies necessary to clean up a spill will be immediately available on-site. Such items may include, but are not limited to:

- Shovel, rake
- Clay absorbent
- Polyethylene liner
- Personal safety equipment
- Steel drums
- Pumps and miscellaneous hand tools

The major supply of material and equipment will be located in the Support Zone. Smaller supplies will kept at active work locations. The emergency coordinator will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the Client. If necessary, soil, water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean-up effort. The emergency coordinator will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The emergency coordinator will review the cause with the Client Representative and obtain his concurrence with the remedial action plan.

SECTION 9.0 TRAINING REQUIREMENTS

All field employees are required to take a 40-hour training class and pass a written examination. This training covers all forms of personal protective equipment, toxicological effects of various chemicals, handling of unknown tanks and drums confined-space entry procedures, and electrical safety. This course shall be in full compliance with OSHA requirements in 29 CFR 1910.120. In addition, all employees shall receive annual 8-hour refresher training and supervisory personnel an additional 8-hour training in managing hazardous waste operations.

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and be required to sign the Site Safety Plan Acknowledgment in Appendix A.

Site specific training for the Bayonne Barrel & Drum Site, Newark, New Jersey will include potential site contaminants, site physical and environmental hazards, emergency response, and evacuation procedures. Emergency telephone numbers will be posted at the site location before any work at the site begins.

SECTION 10.0

MEDICAL SURVEILLANCE PROGRAM

All site personnel shall participate in a medical monitoring program as outlined below. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. This program was developed in conjunction with a consultant toxicologist. Other medical consultants are retained when additional expertise is required.

TABLE 10.1
WORKER MEDICAL PROFILE

| <i>Item</i> | <i>Initial</i> | <i>Annual</i> |
|------------------------------------------------|----------------|------------------|
| Medical History | X | X |
| Work History | X | X |
| Visual Acuity and Tonometry | X | X |
| Pulmonary Function Tests | X | X |
| Physical Examination | X | X |
| Audiometry Tests | X | X |
| Chest X-Ray | X | X |
| Complete Blood Counts | X | X |
| Blood Chem. (SSAC-23 or equivalent) | X | X |
| Urinalysis | X | X |
| Dermatology Examination | X | X |
| Electrocardiogram (Stress Test) - based on age | X | X (based on age) |

Specific Tests (as required): (PCB blood or fat, urine mercury, urine arsenic, urine phenol, urine halomethanes, blood cyanide, cholinesterase-pseudo-cholinesterase, nerve conduction velocity tests, blood lead, urine lead). No specific monitoring is required for this project.

10.1 EXAMINATION SCHEDULE

Employees are examined initially upon start of employment, annually thereafter, and may be examined upon termination of employment. Unscheduled medical examinations are conducted:

- At employee request after known or suspected exposure to toxic or hazardous materials
- At the discretion of the client, the CIH, SSO, or employer occupational physician after known or suspected exposure to toxic or hazardous materials
- At the discretion of the employer occupational physician

All nonscheduled medical examinations will include, as a minimum, all items specified above for periodic surveillance examination, with the exception of the chest X-ray, which will be conducted at the discretion of the occupational physician performing the examination.

APPENDIX A

HEALTH AND SAFETY PLAN CERTIFICATION

HEALTH-AND-SAFETY PLAN CERTIFICATION

By signing this document, I am stating that I have read and understand the site health-and-safety plan for OHM Remediation Services Corp. personnel and visitors entering the _____ site.

[illegible]

APPENDIX B

MSDS LIST

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY, NY 12303-1836 USA
(518) 377-8855



No. 441

METHYL METHACRYLATE
(Monomer)

Date July 1980

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: METHYL METHACRYLATE (Monomer)
OTHER DESIGNATIONS: 2-Methyl Propenoic Acid Methyl Ester; Methacrylic Acid Methyl Ester; MME; Acrylic Resin Monomer; CAS #000 080 626; $\text{CH}_2\text{C}(\text{CH}_3)\text{COOCH}_3$
MANUFACTURER: Available from several suppliers:
Union Carbide
270 Park Avenue
New York, NY 10017

SECTION II. INGREDIENTS AND HAZARDS

| | % | HAZARD DATA |
|--------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------|
| Methyl Methacrylate | >98(a) | TLV 100 ppm or * 410 mg/m ³ |
| (a) Usually contains an inhibitor (hydroquinone or mono-methyl ether of hydroquinone) to prevent self-polymerization. (See Sect. IX) | | Human, inhalation TCLo 125 ppm (irritation effects) |
| * Current (1980) ACGIH & OSHA TLV. | | TCLo 150 mg/m ³ (CNS effects) |
| Status: Currently under test by NCI for carcinogenicity by standard bioassay protocol as of Sept. 1978. | | Rat, intraperitoneal TDLo 800 mg/kg (5-15D preg) Teratogenic effect |

SECTION III. PHYSICAL DATA

| | | | |
|---------------------------------|-------|---------------------------|--------|
| Boiling point, 760 mm Hg, deg C | 100-1 | Specific gravity, 20/4 C | 0.936 |
| Vapor density (Air=1) | 3.45 | Melting point, deg C | -48 C |
| Vapor pressure, mm Hg @ 20 C | 28 | Molecular weight | 100.13 |
| @ 30 C | 49 | Evaporation rate (BuAc=1) | 3.1 |
| Solubility in water, % by wt | 1.5 | | |

Appearance & Odor: Colorless, volatile liquid with a sweet, sharp odor. It is expected that workers will be able to identify this odor at concentrations above 0.34 ppm.

SECTION IV. FIRE AND EXPLOSION DATA

| | | | LOWER | UPPER |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------|-------|-------|
| Flash Point and Method | Autoignition Temp. | Flammability Limits In Air | | |
| 50 F (0 C) | 790 F | % by volume | 2.1 | 12.5 |
| Extinguishing Media: Use CO ₂ or dry chemicals for small fires, alcohol foam or water fog for large fires. Water spray may be ineffective as an extinguishing agent, but should be used to cool fire exposed containers and to flush non-ignited spills or vapors away from source of ignition. | | | | |
| Vapors are heavier than air & may travel a considerable distance to a source of ignition and flash back. | | | | |
| Polymerization may occur at elevated temperatures; if this occurs within a closed container violent rupture may occur. | | | | |
| Firefighters to wear full protective clothing & self-contained breathing apparatus. | | | | |

SECTION V. REACTIVITY DATA

In suitable closed containers, inhibited MME is stable at room temperature, for a limited storage period. Hazardous polymerization may occur, especially when heated or catalyzed.
It is incompatible with polymerization catalysts (peroxides, persulfates), light, heat, nitric acid and other strong oxidizers, ammonia and amines, halogens and halogen compounds.
MME must be inhibited during shipment and storage (see Sect. XI). Vapors are uninhibited & may form polymers in vents, causing stoppage.
It is a flammable liquid. Thermal-oxidative degradation can produce toxic and corrosive materials, including carbon monoxide.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 100 ppm (See Sect. II)

This material is an irritant to the eyes, skin, and respiratory tract. Symptoms of overexposure to vapors can include headache, drowsiness, nausea, anorexia, irritability, and narcosis. It can produce dermatitis and is a skin sensitizer [Spealman, Ind. Med. Surg., 14, 292 (1945)]. Irritation of mucosa has been reported at 62 ppm in air in Russian publications. Ingestion produces acute systemic effects, but toxicity is low to moderate.

FIRST AID:

Eye Contact: Flush eyes thoroughly with running water for 15 minutes. Contact physician.

Skin Contact: Flush affected areas thoroughly with lots of water. Remove contaminated clothing promptly. If irritation persists or if large areas of the body are affected, contact physician.

Inhalation: Remove to fresh air at once. Restore and/or support breathing if required. Get medical help if collapse has occurred or if irritation persists.

Ingestion: Get medical help! If victim is conscious and medical help is not readily available, give large amounts of water to drink and induce vomiting.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of large spills. Remove all sources of ignition. Provide optimum explosion-proof ventilation.

Those involved in clean-up need protection against liquid contact and vapor inhalation.

Contain spill and collect liquid. Place in approved waste container for flammable liquid for prompt disposal. Pick up small spills and residues with inert solid absorbent such as vermiculite or dry sand, using nonsparking tools.

DISPOSAL: Burn scrap materials in an approved incinerator. Liquid waste can be mixed with solvent for burning. Do not discharge into waterways (toxic to fish) or dispose of in a landfill. Follow Federal, State, and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. A chemical cartridge respirator (organic chemical cartridge) with a full facepiece can be used up to 1000 ppm for nonroutine or emergency conditions above the TLV. Self-contained or air-supplied breathing equipment should be used above 1000 ppm.

Workers should use impervious gloves and chemical safety goggles; additional protective clothing should be used if needed to prevent repeated or prolonged contact of methyl methacrylate with the skin.

An eyewash station should be available in areas of handling; a safety shower is needed where exposure to large amounts is possible.

Follow good hygienic practice. Wear clean work clothing. Contaminated clothing must be washed thoroughly before reuse. Clothing wet with methyl methacrylate is also a fire hazard and must be removed promptly.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in a cool, well-ventilated, low-fire risk area in closed containers. Keep away from sources of heat and ignition and away from incompatible materials (see Sect. V). Protect containers from physical damage. Ground containers for transfers. (See flammable and combustible liquids code - NFPA 30, and National Electrical Code NFPA 70, 77.)

Control inventory. Check the inhibitor concentration regularly. For the inhibitor to be effective low levels of dissolved oxygen must be present in MME. Do not store under pure nitrogen or sparge with nitrogen or other oxygen-free gas. Use with adequate ventilation. Avoid contact with liquid and inhalation of vapor.

DOT Classification - FLAMMABLE LIQUID.

DATA SOURCE(S) CODE: 1-12, 18, 20, 23, 25, 27, 31, 37

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APPROVALS: MIS
CRD

Industrial Hygiene
and Safety

MEDICAL REVIEW: 5 August 1980

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
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(518) 377-8855



NO. 530

PETROLEUM "ETHER",
HIGH BOILING

DATE May 1984

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: PETROLEUM "ETHER", HIGH BOILING
DESCRIPTION: Distillation mixture of aliphatic hydrocarbons mainly in C₇ to C₈ range.
OTHER DESIGNATIONS: Ligroin(e); Aliphatic Naphtha, CAS #008 030 317, CAS #008⁸030 306;
CAS #008 032 324 (C₅-C₁₂ Aliphatic hydrocarbons); CAS #064 748 898 Light Aliphatic
Solvent Naphtha (see also MSDS #518)
MANUFACTURER: Available from several suppliers, including:
Fisher Scientific Co. - Chemical Manufacturing Div.
P.O. Box 375, Reagent Lane
Fair Lawn, NJ 07410 Tel: (201) 796-7100

SECTION II. INGREDIENTS AND HAZARDS

Typical Composition:

Petroleum distillate (Aliphatic Naphtha C₇-C₈)*
n-Hexane (Minor fraction or nil; see MSDS #397)
Heptanes } (Major fraction)
Octanes }
Other Hydrocarbons (Minor fraction or nil)

*Petroleum fraction related to MSDS #518 but of higher boiling range, higher density, higher flash point.

**Current OSHA PEL; NIOSH (1977) recommended a 10-hr TWA for all petroleum distillates of 350 mg/m³ (85 ppm for heptane; 75 ppm for octane).

| % | HAZARD DATA | |
|------|---------------|--------------|
| ~100 | 8-hr TWA, ppm | |
| | OSHA | ACGIH (1983) |
| | PEL** | TLV |
| | 500 | 50 |
| | 500 | 400 |
| | 500 | 300 |
| | - | - |

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg C ----- 80-130* Specific gravity, (H₂O=1) ----- 0.68-0.72*
Vapor pressure, 20C, mm Hg ----- ~40* Volatiles, % ----- ~100
Vapor density (Air=1) ----- ~3.4
Solubility in water ----- Insoluble

Appearance & Odor: Clear, colorless liquid. Slight, characteristic odor.

*Exact values depend on the particular petroleum "ether" cut used. Cuts narrower and lower boiling than this range are also used (see also MSDS #518).

SECTION IV. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temp. | Flammability Limits in Air | Lower | Upper |
|------------------------|--------------------|----------------------------|-------|-------|
| | | | | |
| >15F (CC) | ~450F | % by Volume | ~1 | ~6 |

Extinguishing media: Dry chemical, carbon dioxide, foam. Use water spray to cool fire-exposed containers and surroundings. Use smothering technique to put out fires. Water may be ineffective. Forced water stream could scatter fire. Highly flammable when exposed to heat or flame. Readily volatilizes to form explosive vapor-air mixtures. Vapors can flow along surfaces to distant ignition sources and flashback.
Firefighters should wear self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not polymerize. Heating greatly increases the flammability hazard of this OSHA Class IB Flammable Liquid.
It is incompatible with strong oxidizing agents.
Thermal-oxidative degradation can yield partial oxidation products, hydrocarbons, carbon monoxide and carbon dioxide.

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| SECTION VI. HEALTH HAZARD INFORMATION | TLV ~300 ppm (See Sect II) |
| <p>Excessive inhalation of fumes, vapor or mist irritates respiratory passages and can cause headache, dizziness, nausea, inebriation, peripheral nerve disorder (n-hexane metabolites in particular), CNS depression depending on conc. and time of exposure. Contact with high vapor levels or liquid causes transitory irritation of eyes.</p> <p>Liquid contact with skin is defatting and irritating; prolonged or repeated contact can cause dermatitis. Ingestion causes irritation to mouth, throat, G.I. tract with coughing, vomiting, blurred vision, dilated pupils and diarrhea as symptoms. Aspiration into lungs may cause hemorrhaging, pulmonary edema and chemical pneumonitis.</p> <p>FIRST AID:</p> <p><u>Eye Contact:</u> Flush thoroughly with running water for 15 min., including under eyelids.</p> <p><u>Skin Contact:</u> Remove contaminated clothing. Wash affected area with soap and water. Get medical help if large areas of body are exposed or if irritation persists.</p> <p><u>Inhalation:</u> Remove to fresh air. Restore and/or support breathing. Have trained person administer oxygen if breathing is difficult. Call a physician.</p> <p><u>Ingestion:</u> Contact physician! <u>Aspiration hazard!</u> Do not induce vomiting. Give 2-4 oz. olive oil or USP white mineral oil to drink. If spontaneous vomiting occurs, hold victim's head lower than hips to help avoid aspiration.</p> | |
| SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES | |
| <p>Evacuate area for large spills. Provide explosion-proof ventilation; remove ignition sources. Those involved in clean up should use protection against liquid contact and vapor inhalation. Contain spill. Do not send to sewer or allow to enter streams or surface water. Pick up liquid for reclaim or disposal. Add absorbent solid (sand or vermiculate) to small spills and residues and pick up and place in appropriate closed container for disposal using non-sparking tools. Trace residues and vapors can be dispersed with evaporation and ventilation.</p> <p>DISPOSAL: Scrap solvent may be disposed of through a licensed waste disposal company, or by controlled incineration; absorbed material can be buried in an approved landfill. Report spills that enter (or threaten to enter) navigable waters.</p> <p>Follow Federal, State, and Local regulations.</p> | |
| SECTION VIII. SPECIAL PROTECTION INFORMATION | |
| <p>Use general ventilation and local exhaust ventilation (explosion-proof) to keep vapors and mists at a low level. Where respiratory protection is needed, an approved organic vapor cartridge respirator with full facepiece can be used below 1000 ppm. A chin type organic vapor canister gas mask is required above 1000 ppm. Use an air-supplied or self-contained respirator with full facepiece above 5000 ppm.</p> <p>Use rubber gloves to prevent repeated or prolonged contact with liquid and safety glasses for eye protection where splashing is possible. Conditions of use may require additional protection against body contact with liquid.</p> <p>Provide an eyewash station, washing facilities and safety shower.</p> <p>Promptly remove and isolate solvent-contaminated clothing (fire and health hazard); launder before reuse.</p> | |
| SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS | |
| <p>Store in closed containers in a well-ventilated area. Keep away from strong oxidizing agents and sources of heat or ignition. No smoking in areas of storage or use. Electrically bond and ground containers for transfers to prevent static electric sparks. Near this material use explosion-proof electrical equipment and non-sparking tools. Handle and store as an OSHA Class IB flammable liquid.</p> <p>Wear clean work clothing. Use with good ventilation. Follow good hygiene practice. Avoid prolonged or repeated skin contact and breathing of vapors or mists. DO NOT INGEST!</p> <p>DOT Classification: FLAMMABLE LIQUID I.D. No. UN1255 Petroleum Naphtha Label: FLAMMABLE NA1268 Naphtha Distillate LIQUID UN1266 Petroleum Distillate</p> <p>DATA SOURCE(S) CODE: 1,2,4-7,9,12,14,31,34,38</p> | |
| <p>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</p> | <p>APPROVALS: MIS/CRD <i>J.M. Nielsen</i></p> <p>INDUST. HYGIENE/SAFETY <i>JNI 5/29/84</i></p> <p>MEDICAL REVIEW: 15 June 1984</p> |

Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
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GENIUM PUBLISHING CORP.

No. 311

METHYL CHLOROFORM

(Revision E)

Issued: November 1975

Revised: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: METHYL CHLOROFORM

Description (Origin/Uses): Used in cold-type metal cleaning; also in cleaning plastic molds.

Other Designations: 1,1,1-Trichloroethane; CH_3CCl_3 ; CAS No. 0071-55-6

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS

H 2 R 1

F 0 I -

R 1 S 2

PPG* K 1

*See sect. 8



NFPA

SECTION 2. INGREDIENTS AND HAZARDS/EXPOSURE LIMITS

Methyl Chloroform, CAS No. 0071-55-6

OSHA PELs

8-Hr TWA: 350 ppm, 1900 mg/m³

STEL: 450 ppm, 2450 mg/m³

ACGIH TLVs, 1988-89

TLV-TWA: 350 ppm, 1900 mg/m³

TLV-STEL: 450 ppm, 2450 mg/m³

Toxicity Data**

Man, Inhalation, LC_{50} : 27 g/m³ (10 Mins)

Man, Inhalation, TC_{50} : 350 ppm

Human, Oral, TD_{50} : 670 mg/kg

Rat, Oral, LD_{50} : 10300 mg/kg

*Contact your supplier for specifications, including details about inhibitors that can be added to the methyl chloroform product.

**See NIOSH, *RTECS* (KJ2975000), for additional data with references to irritative, reproductive, and mutagenic effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 165°F (74.1°C)

Melting Point: -26.5°F (-32.5°C)

Vapor Density (Air = 1): 4.55

Vapor Pressure: 100 Torr at 68°F (20°C)

Molecular Weight: 133 Grams/Mole

Solubility in Water (%): Insoluble

Specific Gravity ($\text{H}_2\text{O} = 1$): 1.3376 at 68°F (20°C)

% Volatile by Volume: Ca 100

Appearance and Odor: A colorless liquid; mild, sweetish, pleasant, etherlike odor that may be just perceptible (if unfatigued) at about 100 ppm in the air.

Comments: Small variations in the above-noted physical properties are expected because of the various inhibitors that may be included in the methyl chloroform product.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point: None Found

Autoignition Temperature: 998°F (537°C)

LEL: 8.0% v/v

UEL: 10.5% v/v

Extinguishing Media: Methyl chloroform does not burn at ordinary temperatures. High-energy sources such as an electric arc or an elevated temperature are required for ignition of this material. When the source of ignition is removed, methyl chloroform tends to stop burning. Use water spray to cool fire-exposed containers. Use water fog, carbon dioxide, dry chemical, or foam to fight fires involving this material or nearby fires. Unusual Fire or Explosion Hazards: Methyl chloroform vapor is heavier than air and may travel a considerable distance to a low-lying high-energy source of ignition and flash back to its origin. Use care in selecting equipment (see sect. 5, Comments). Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Methyl chloroform is stable in closed containers during routine operations. Hazardous polymerization cannot occur. Chemical Incompatibilities: Methyl chloroform can react dangerously with acetone, nitrogen tetroxide, oxygen (gas or liquid), sodium, sodium hydroxide, and sodium-potassium alloys. Conditions to Avoid: Avoid exposure to any high-energy source of ignition or to incompatible chemicals. Hazardous Products of Decomposition: Toxic and corrosive gases such as hydrogen chloride, dichloroacetylene, chlorine, and phosgene can be produced by decomposition of methyl chloroform at high temperatures, contact with hot metals, or exposure to ultraviolet radiation. Phosgene is usually produced in very small quantities; however, the significant irritating properties of hydrogen chloride (the dominant product of decomposition) prevent significant exposure to the phosgene. Comments: This material can be hydrolyzed by water to form hydrochloric acid and acetic acid. It will react with strong caustics to form flammable or explosive materials. It attacks natural rubber. Methyl chloroform requires an inhibitor content to prevent corrosion of metals. When the inhibitor is depleted, this material can decompose rapidly by reaction with finely divided white metals such as aluminum, magnesium, or zinc. Do not use these metals in pressurized spraying equipment where methyl chloroform is involved.

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: Methyl chloroform is not listed as a carcinogen by the NTP, IARC, or OSHA.

Summary of Risks: Methyl chloroform exhibits low oral toxicity. It can defat the exposed skin of workers and cause redness and scaling. Although methyl chloroform is low in systemic toxicity, it is an anesthetic that is capable of causing death if it is inhaled at concentrations of 14000 to 15000 ppm. Fatalities that have occurred in poorly ventilated areas such as pits or tanks are attributed to anesthesia and/or sensitization of the myocardium to epinephrine. Quick and complete recovery is reported upon prompt removal of unconscious exposed persons from the area of exposure. The TLV-TWA cited in section 2 is set to prevent initial anesthetic effects and/or objections to the

SECTION 6. HEALTH HAZARD INFORMATION, cont.

odor. Medical Conditions Aggravated by Long-Term Exposure: None reported. Target Organs: Skin, eyes, heart, cardiovascular system, and CNS. Primary Entry: Inhalation, skin absorption. Acute Effects: Headache, lassitude, dermatitis, skin and eye irritation, cardiac arrhythmias, and depression of the CNS. Chronic Effects: None reported. FIRST AID: Eyes. Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 minutes. Skin. Rinse the affected area with flooding amounts of water, then wash it with soap and water. Inhalation. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. Ingestion. Unlikely. Should this type of exposure occur, medical help is not readily available, and the amount swallowed was appreciable, give the exposed person milk of magnesia to drink and induce vomiting. Repeat this procedure. Aspiration hazards exist, so the decision whether or not to induce vomiting must be made carefully. If vomiting is to be induced, carry it out as quickly as possible before the ingested methyl chloroform is internally absorbed. This procedure would increase the chance of aspiration. Get medical help (in plant, paramedic, community) for all exposures. Seek prompt medical assistance for further treatment, observation, and support after first aid. Note to Physician: The estimated lethal dose by ingestion for a man weighing 150 pounds is 0.5 to 1 pint. Do not use adrenalin or sympathomimetic amines in treatment because of the increased cardiac sensitivity involved. Ingestion may cause spontaneous vomiting.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, evacuate unnecessary personnel, eliminate all sources of ignition immediately, and provide adequate explosion-proof ventilation. Cleanup personnel need protection against skin or eye contact with this liquid as well as inhalation of its vapor (see sect. 8). Contain large spills and collect or absorb waste with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place liquid or absorbent waste into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways. Waste Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U226

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Resource Conservation and Recovery Act, § 3001.

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). Respirator: Use a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. Warning: Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. Other: Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent prolonged or repeated skin contact with this material. Suggested materials include neoprene, polyvinyl alcohol, or polyethylene. Natural rubber is not recommended. Ventilation: Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. Contaminated Equipment: Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. Other: Exercise care in the selection of safety and handling equipment because methyl chloroform attacks natural rubber. Comments: Practice good personal hygiene; always wash thoroughly after using this material. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale methyl chloroform vapor. Consider functions of the CVS, CNS, liver, and skin while administering preplacement and periodic medical exams.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store methyl chloroform in closed containers in a cool, dry, well-ventilated area away from sources of ignition and incompatible chemicals (see sect. 5). Protect containers from physical damage. Steel is a recommended material for storage containers. Special Handling/Storage: Prevent moisture contamination of storage facilities. Monitor levels of inhibitor. Use caution in cleaning operations involving white metal fines (see sect. 5). Engineering Controls: Make sure all engineering systems (production, transportation) are of maximum, explosion-proof design. Electrically ground and bond all containers and pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations to prevent generating static sparks. Other: Personnel who regularly work with methyl chloroform should avoid drinking alcoholic beverages shortly before, during, or after exposure.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: 1,1,1-Trichloroethane

DOT Hazard Class: ORM-A

ID No. UN2831

DOT Packaging Requirements: 49 CFR 173.605

DOT Packaging Exceptions: 49 CFR 173.605

IMO Shipping Name: 1,1,1-Trichloromethane

IMO Hazard Class: 6.1

IMO Label: Saint Andrew's Cross (X)*

IMDG Packaging Group: III

*Harmful-Stow away from Foodstuffs (Materials of Class 6.1 Packaging Group III).

References: 1, 38, 84-94, 116, 117, 120, 122.

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Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

MATERIAL SAFETY DATA SHEET

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GENIUM PUBLISHING CORP.

NO. 514

P-DICHLOROBENZENE

DATE October 1983

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: p-DICHLOROBENZENE

OTHER DESIGNATIONS: 1,4-Dichlorobenzene, p-Dichlorobenzol, Paradichlorobenzene, PDCB, CAS #000 106 467

MANUFACTURER: Available from several suppliers, including:

Standard Chlorine Chemical Co.

Dow Chemical Co.

1035 Belleville Turnpike

2020 Dow Center

Kearny, NJ 07032

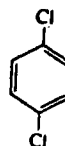
Midland, MI 48640

Tel: (201)997-1700

Tel: (517)636-1000

SECTION II. INGREDIENTS AND HAZARDS

p-Dichlorobenzene



*Current OSHA and ACGIH (1983) TLV.

%

HAZARD DATA

>99

8-hr TWA 75 ppm or
450 mg/m³*

Human, Oral

TDLo 300 mg/kg

TFX: Systemic effect

Rat, Oral

LD₅₀ 500 mg/kg

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg C (F) -- 174 (345)
(Solid sublimes slowly at 25C)

Specific gravity (liquid) 55/4C -- 1.248

Specific gravity (solid) 20/4C --- 1.458

Vapor pressure, 25C, mm Hg ----- 0.4

Melting point, deg C ----- 53

Solubility in water, gm/100gm ---- 0.008

Molecular weight ----- 147

Appearance & Odor: A clear liquid melt or white crystals or flakes; distinctive mothball-like odor, detectable at 15-30 ppm with a strong odor at 30-60 ppm. (PDCB has good warning properties)

SECTION IV. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temp. | Flammability Limits in Air | Lower | Upper |
|------------------------|--------------------|----------------------------|-------|-------|
| >150F (TCC) | >560C | % by volume | 2.5 | - |

Extinguishing media: Dry chemical, carbon dioxide, alcohol foam, water spray.

Explosive mixtures may be formed in air when this material is heated, such as in a fire.

Use water spray to keep fire exposed containers cool, to disperse vapors, or to blanket a pool fire.

Firefighters should wear self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

PDCB is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

It is incompatible with strong oxidizers such as chlorine and permanganate.

Thermal-oxidative degradation products include carbon dioxide, carbon monoxide and hydrogen chloride.

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| SECTION VI. HEALTH HAZARD INFORMATION | TLV 75 ppm (See Sect II) |
| <p>Excessive inhalation of vapors/fumes or dust is irritating to upper respiratory tract. Vapors are readily absorbed through the lungs. Painful irritation to the nose and eyes can occur at 50-80 ppm, severe discomfort at 160 ppm. Inhalation above the TLV causes headache, rhinitis, nausea, dizziness and anorexia. Chronic excessive exposure may damage the kidneys and liver.</p> <p>Skin contact causes very little irritation. Solid material can cause slight burning sensation when held close to body. Contact with liquid PDCB is irritating. Prolonged or repeated skin contact with warm fumes or strong soln. may cause slight irritation. No evidence of hazardous absorption through skin.</p> <p>FIRST AID:</p> <p><u>Eye Contact:</u> Flush thoroughly with running water for 15 min. including under eyelids.</p> <p><u>Skin Contact:</u> Remove contaminated clothing. Wash affected area with soap and water.</p> <p><u>Inhalation:</u> Remove to fresh air. Restore and/or support breathing as needed.</p> <p><u>Ingestion:</u> Give 2-3 glasses of water. Induce vomiting.</p> <p>Seek medical assistance for further treatment, observation and support after first aid.</p> | |
| SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES | |
| <p>Notify safety personnel. Remove sources of heat or ignition.</p> <p>Provide adequate ventilation. Clean up personnel to use protective equipment to avoid liquid contact or vapor inhalation.</p> <p>Contain liquid spills by diking; allow to cool and solidify. Scoop up solid and place in appropriate drums for disposal or reclamation. Absorbent solid can be used with small liquid spills.</p> <p>DISPOSAL: Waste can be burned in an approved, scrubber-equipped incinerator, deposited in an approved landfill, or disposed of via a licensed waste disposal company.</p> <p>Follow Federal, State, and Local regulations.</p> <p>EPA(RCRA) HW No. U072 [40 CFR 261], EPA(CWA) RQ is 100 lb. [40 CFR 117]</p> | |
| SECTION VIII. SPECIAL PROTECTION INFORMATION | |
| <p>Provide adequate general and local exhaust ventilation to meet TLV requirements. Respirators with full facepiece should be available for nonroutine and emergency use above the TLV. Self-contained breathing apparatus or gas mask with organic vapor canister and dust filter is suitable to 1000 ppm.</p> <p>Use neoprene gloves and safety glasses. (Use of body covering clothing, faceshield and other protection may be indicated by specific conditions to avoid contact.)</p> <p>Eyewash stations and washing facilities should be accessible to areas of use and handling.</p> | |
| SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS | |
| <p>Store in closed containers in a cool, dry, well-ventilated area away from oxidizing agents and from sources of heat and ignition. Protect containers from physical damage. Outside or detached storage is preferred.</p> <p>Avoid inhalation of dust or vapors. Avoid contact with eyes and skin (especially when heated). Practice good personal hygiene. Launder contaminated clothing before reuse.</p> <p>Acute overexposure unlikely due to warning properties (odor and irritation). Individual may develop tolerance to high levels of exposure.</p> <p>DOT Classification: ORM-A I.D. No. UN1592 LABEL: None</p> <p>DATA SOURCE(S) CODE: 1-7,9,10,12,14,16,23,26,31,34,43,48</p> | |
| <p>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</p> | <p>APPROVALS: MIS/CRD <i>J.M. Quinn</i></p> <p>INDUST. HYGIENE/SAFETY <i>JW 9-8-83</i></p> <p>MEDICAL REVIEW: 17 September 1983</p> |

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
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No. 624

NAPHTHALENE

Issued: November 1987

SECTION 1. MATERIAL IDENTIFICATION

24

Material Name: NAPHTHALENE

Description (Origin/Uses): Used as a moth repellant and in many industrial processes.

Other Designations: Naphthalin; Naphthene; Tar Camphor; $C_{10}H_8$;
NIOSH RTECS No. QJ0525000; CAS No. 0091-20-3

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the
Chemicalweek Buyer's Guide (Genium ref. 73) for a list of suppliers.

HMIS

H 2

F 2

R 0

PPG*

*See sect. 8

R 1

I 4

S 1

K 2



SECTION 2. INGREDIENTS AND HAZARDS

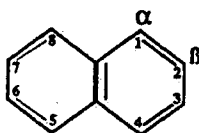
%

EXPOSURE LIMITS

Naphthalene, CAS No. 0091-20-3

ca 100

IDLH* Level: 500 ppm



*Immediately dangerous to life and health

**See NIOSH RTECS for additional data with references to irritative, mutagenic,
reproductive, and tumorigenic effects.

ACGIH TLVs, 1987-88

TLV-TWA: 10 ppm, 50 mg/m³

OSHA PEL

8-Hr TWA: 10 ppm, 50 mg/m³

Toxicity Data**

Child, Oral, LD₅₀: 100 mg/kg

Man, Unknown, LD₅₀: 74 mg/kg

Rat, Oral, LD₅₀: 1250 mg/kg

SECTION 3. PHYSICAL DATA

Boiling Point: 424°F (218°C)

Vapor Density (Air = 1): 4.4

Vapor Pressure: 0.087 Torr at 77°F (25°C)

Water Solubility: Insoluble

Specific Gravity ($H_2O = 1$): 1.162 at 68°F (20°C)

Melting Point: 176°F (80°C)

Molecular Weight: 128 Grams/Mole

% Volatile by Volume: ca 100

Appearance and Odor: White crystalline flakes; strong coal tar odor.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temperature

Flammability Limits in Air

174°F (79°C) OC; 190°F (88°C) CC

979°F (526°C)

% by Volume

0.9

5.9

Extinguishing Media: Use water spray, dry chemical, or carbon dioxide to fight fires involving naphthalene. Caution: Foam or direct water spray applied to molten naphthalene may cause extensive foaming.

Unusual Fire or Explosion Hazards: Naphthalene is a volatile solid that gives off flammable vapor when heated (as in fire situations). This vapor is much denser than air and will collect in enclosed or low-lying areas like sumps. In these areas an explosive air-vapor mixture may form, and extra caution is required to prevent any ignition sources from starting an explosion or fire.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Naphthalene is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

Chemical Incompatibilities: Naphthalene is incompatible with strong oxidizing agents, chromic anhydride, and mixtures of aluminum trichloride and benzoyl chloride.

Conditions to Avoid: Ignition sources like open flame, unprotected heaters, excessive heat, lighted tobacco products, and electric sparks must not occur in work areas where naphthalene vapor may become concentrated.

Hazardous Products of Decomposition: Toxic gases like carbon monoxide are produced during fire conditions. Irritating, flammable vapor forms below the melting point because even solid naphthalene has a significant vapor pressure.



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ATTN: SAFETY DIRECTOR
O H MATERIALS CORP
P O BOX 551
FINDLAY OH 45839
AL SMITH

DATE: 01/19/88
CUST # 370029 P.O. # J5625-37196

M A T E R I A L S A F E T Y D A T A S H E E T PAGE: 1

IDENTIFICATION

PRODUCT # 29478-0 NAME: O-XYLENE, ANHYDROUS, 97%
CAS # 95-47-6

TOXICITY HAZARDS

RTECS # 7E2450000

O-XYLENE

TOXICITY DATA

IHL-HMN LCLO:6125 PPM/12H

YAKUD5 22,883.80

IPR-MUS LD50:1364 MG/KG

ARTOON 58,106.85

REVIEWS, STANDARDS, AND REGULATIONS

ACGIH TLV-TWA 100 PPM; STEL 150 PPM 85INAB 5,637.86

MSHA STANDARD-AIR:TWA 100 PPM (440 MG/M3) (SKIN) DTLVS# 3,281.71

OSHA STANDARD-AIR:TWA 100 PPM FEREAC 39,23540.74

NIOSH REL TO XYLENE-AIR:TWA 100 PPM;CL 200 PPM/10M MMWR# 34(1S),31S,

EPA TSCA CHEMICAL INVENTORY, 1986

EPA TSCA 8(A) PRELIMINARY ASSESSMENT INFORMATION, FINAL RULE FEREAC
47,26992.82

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1987

MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREAC 47,30420.
82

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)
DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION

HEALTH HAZARD DATA

ACUTE EFFECTS

MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.

VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES AND UPPER
RESPIRATORY TRACT.

EXPOSURE CAN CAUSE:

NARCOTIC EFFECT

LUNG IRRITATION, CHEST PAIN AND EDEMA WHICH MAY BE FATAL.

CNS DEPRESSION

DERMATITIS

GASTROINTESTINAL DISTURBANCES

CHRONIC EFFECTS

DAMAGE TO THE LIVER

DAMAGE TO THE KIDNEYS

BLOOD EFFECTS

FIRST AID

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS
AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED
CLOTHING AND SHOES.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

CALL A PHYSICIAN.

WASH CONTAMINATED CLOTHING BEFORE REUSE.

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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE: 2

CATALOG # 24478-0

NAME: D-XYLENE, ANHYDROUS, 97%

-----PHYSICAL DATA-----

BOILING POINT: 143 C TO 145 C

SPECIFIC GRAVITY: 0.869

VAPOR DENSITY: 3.7

-----FIRE AND EXPLOSION HAZARD DATA-----

LOWER EXPLOSION LEVEL: 1.2

UPPER EXPLOSION LEVEL: 7%

FLASH POINT: 90 F

EXTINGUISHING MEDIA

CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

WATER MAY BE EFFECTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

FLAMMABLE.

USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.

UNUSUAL FIRE AND EXPLOSION HAZARDS

VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.

CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

FORMS EXPLOSIVE MIXTURES IN AIR.

-----REACTIVITY DATA-----

INCOMPATIBILITIES

OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

TOXIC FUMES OF:

CARBON MONOXIDE, CARBON DIOXIDE

-----SPILL OR LEAK PROCEDURES-----

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

EVACUATE AREA.

SHUT OFF ALL SOURCES OF IGNITION.

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY

RUBBER GLOVES.

COVER WITH AN ACTIVATED CARBON ADSORBENT, TAKE UP AND PLACE IN CLOSED CONTAINERS. TRANSPORT OUTDOORS.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

WASTE DISPOSAL METHOD

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.

MECHANICAL EXHAUST REQUIRED.

SAFETY SHOWER AND EYE BATH.

USE NONSPARKING TOOLS.

DO NOT BREATHE VAPOR.

AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

WASH THOROUGHLY AFTER HANDLING.

IRRITANT.

KEEP TIGHTLY CLOSED.

KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.

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PAGE: 3

CATALOG # 27478-0

NAME: O-XYLENE, ANHYDROUS, 97%

STORE IN A COOL DRY PLACE.

----- ADDITIONAL PRECAUTIONS AND COMMENTS -----

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

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PRECAUTIONARY LABELING (CONTINUED)

=====

KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS.
TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES.

SAF-T-DATA* STORAGE COLOR CODE: RED (FLAMMABLE)

=====

SECTION II - COMPONENTS

=====

| COMPONENT | CAS NO. | WEIGHT % | OSHA/PEL | ACGIH/TLV |
|-----------|----------|----------|----------|-----------|
| TOLUENE | 108-88-3 | 90-100 | 100 PPM | 100 PPM |

=====

SECTION III - PHYSICAL DATA

=====

BOILING POINT: 111 C (231 F)
(AT 760 MM HG)

VAPOR PRESSURE (MMHG): 22
(20 C)

MELTING POINT: -95 C (-139 F)
AT 760 MM HG)

VAPOR DENSITY (AIR=1): 3.2

SPECIFIC GRAVITY: 0.87
(H2O=1)

EVAPORATION RATE: 2.24
(BUTYL ACETATE = 1)

SOLUBILITY(H2O): NEGLIGIBLE (<0.1%)

% VOLATILES BY VOLUME: 100
(21 C)

PH: N/A

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID. AROMATIC ODOR.

=====

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

=====

FLASH POINT (CLOSED CUP): 4 C (40 F)

NEPA 704M RATING: 2-3-0

AUTOIGNITION TEMPERATURE: 479 C (896 F)

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SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

=====

FLAMMABLE LIMITS: UPPER - 7.1 % LOWER - 1.2 %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE. (WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

=====

SECTION V - HEALTH HAZARD DATA

=====

THRESHOLD LIMIT VALUE (TLV/TNA): 377 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 565 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 375 MG/M3 (100 PPM)

TOXICITY OF COMPONENTS

ORAL RAT LD50 FOR TOLUENE

INTRAPERITONEAL MOUSE LD50 FOR TOLUENE

SKIN RABBIT LD50 FOR TOLUENE

5000 MG/KG
1.12 MG/KG
14 G/KG

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SECTION V - HEALTH HAZARD DATA (CONTINUED)

=====

INHALATION-8HR MOUSE LC50 FOR TOLUENE 5320 PPM
CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

EFFECTS OF OVEREXPOSURE

INHALATION: HEADACHE, NAUSEA, VOMITING, DIZZINESS, RESPIRATORY
FAILURE, CENTRAL NERVOUS SYSTEM DEPRESSION, COUGHING,
DIFFICULT BREATHING, CHEST PAINS, NARCOSIS,
UNCONSCIOUSNESS, AND MAY BE FATAL

SKIN CONTACT: IRRITATION, PROLONGED CONTACT MAY CAUSE DERMATITIS

EYE CONTACT: IRRITATION, MAY CAUSE TEMPORARY CORNEAL DAMAGE

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: HEADACHE, NAUSEA, GASTROINTESTINAL IRRITATION,
CONVULSIONS, UNCONSCIOUSNESS, AND MAY BE FATAL

CHRONIC EFFECTS: KIDNEY DAMAGE, LIVER DAMAGE

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
RESPIRATORY SYSTEM DISEASE, SKIN DISORDERS, PULMONARY DISEASE

PRIMARY ROUTES OF ENTRY
INHALATION, ABSORPTION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE
ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE
OXYGEN.

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SECTION V - HEALTH HAZARD DATA (CONTINUED)

=====

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: YES PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE: NO

CERCLA HAZARDOUS SUBSTANCE: YES CONTAINS BENZENE, METHYL- (RQ = 1000 LBS)

SARA 313 TOXIC CHEMICALS: YES CONTAINS TOLUENE

GENERIC CLASS: C01

TSCA INVENTORY: YES

=====

SECTION VI - REACTIVITY DATA

=====

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, NITRIC ACID, SULFURIC ACID, CHLORINE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

=====

SECTION VII - SPILL & DISPOSAL PROCEDURES

=====

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

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SECTION VII - SPILL & DISPOSAL PROCEDURES (CONTINUED)

=====

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U220 (TOXIC WASTE)

=====

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

=====

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

=====

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

=====

SAF-T-DATA# STORAGE COLOR CODE: RED (FLAMMABLE)

STORAGE REQUIREMENTS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID.

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SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: TOLUENE
HAZARD CLASS: FLAMMABLE LIQUID
UN/NA: UN1294 REPORTABLE QUANTITY: 1000 LBS.
LABELS: FLAMMABLE LIQUID
REGULATORY REFERENCES: 49CFR 172.101; 173.119

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: TOLUENE
HAZARD CLASS: 3.2
UN: UN1294 MARINE POLLUTANTS: NO
LABELS: FLAMMABLE LIQUID
REGULATORY REFERENCES: 49CFR 172.102; PART 176; IMD

I.M.O. PAGE: 3108
PACKAGING GROUP: II

AIR (I.C.A.O.)

PROPER SHIPPING NAME: TOLUENE
HAZARD CLASS: 3.2
UN1294
LABELS: FLAMMABLE LIQUID
REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO/IATA

PACKAGING GROUP: II

U.S. CUSTOMS HARMONIZATION NUMBER: 29023000009

=====

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.

EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES

CONTINUED ON PAGE: 8



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AL SMITH

DATE: 01/19/88
CUST # 370029 P.O. # J5625-37196

M A T E R I A L S A F E T Y D A T A S H E E T PAGE: 1

IDENTIFICATION

PRODUCT # 29684-8 NAME: ETHYLBENZENE, ANHYDROUS, 99+%
CAS # 100-41-4

TOXICITY HAZARDS

RTECS # DA0700000

BENZENE, ETHYL-

IRRITATION DATA

SKN-RBT 15 MG/24H OPEN MLD

EYE-RBT 100 MG

AIHAAP 23,95,62

AJOPAA 29,1363,46

TOXICITY DATA

URL-RAT LD50:3500 MG/KG

IPR-MUS LD50:2272 MG/KG

SKN-RBT LD50:17800 MG/KG

AMHAB 14,387,56

ARTODN 58,106,85

FCTXAV 13,803,75

REVIEWS, STANDARDS, AND REGULATIONS

ACGIH TLV-TWA 100 PPM; STEL 125 PPM 85INA8 5,244,86

MSHA STANDARD-AIR:TWA 100 PPM (435 MG/M3) DTLVS# 3,104,71

OSHA STANDARD-AIR:TWA 100 PPM (SKIN) FEREAC 39,23540,74

EPA GENETOX PROGRAM 1986, NEGATIVE: CELL TRANSFORM.-SAT/SHE

EPA TSCA CHEMICAL INVENTORY, 1986

EPA TSCA 8(A) PRELIMINARY ASSESSMENT INFORMATION, FINAL RULE FEREAC 47,26992,82

EPA TSCA SECTION 8(E) STATUS REPORT BEHQ-0680-0345;8EHQ-1080-0368

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1987

NIOSH ANALYTICAL METHODS: SEE HYDROCARBONS, AROMATIC, 1501

NTP CARCINOGENESIS STUDIES:SELECTED, JANUARY 1987

MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREAC 47,30420,82

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

HEALTH HAZARD DATA

ACUTE EFFECTS

MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.

CAUSES SKIN IRRITATION.

VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.

EXPOSURE CAN CAUSE:

NAUSEA, HEADACHE AND VOMITING

CAN CAUSE CNS DEPRESSION.

FIRST AID

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

IF INHALED, REMOVE TO FRESH AIR.

CALL A PHYSICIAN.

WASH CONTAMINATED CLOTHING BEFORE REUSE.

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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE: 3

CATALOG # 29684-8

NAME: ETHYLBENZENE, ANHYDROUS, 99+%

IRRITANT.
KEEP TIGHTLY CLOSED.
KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.
STORE IN A COOL DRY PLACE.

----- ADDITIONAL PRECAUTIONS AND COMMENTS -----

NOT APPLICABLE

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M A T E R I A L S A F E T Y D A T A S H E E T
CATALOG # 27070-9 NAME: BENZENE, 99.9+%, HPLC GRADE

PAGE: 2

82

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION

ADDITIONAL INFORMATION

USHA STANDARD TWA: 1PPM/8HR; STEL: 5PPM/15MIN. EFFECTIVE DATE
DECEMBER 10, 1987.

----- HEALTH HAZARD DATA -----

ACUTE EFFECTS

HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES AND UPPER
RESPIRATORY TRACT.
CAUSES SKIN IRRITATION.

EXPOSURE CAN CAUSE:

NAUSEA, DIZZINESS AND HEADACHE

NARCOTIC EFFECT

CHRONIC EFFECTS

CARCINOGEN.

MAY ALTER GENETIC MATERIAL.

BLOOD EFFECTS

FIRST AID

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS
AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED
CLOTHING AND SHOES.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.

REMOVE AND WASH CONTAMINATED CLOTHING PROMPTLY.

ADDITIONAL INFORMATION

INHALATION OF HIGH CONCENTRATIONS OF BENZENE MAY HAVE AN INITIAL
STIMULATORY EFFECT ON THE CENTRAL NERVOUS SYSTEM CHARACTERIZED BY
EXHILARATION, NERVOUS EXCITATION AND/OR GIDDINESS, DEPRESSION,
DROWSINESS, OR FATIGUE. THE VICTIM MAY EXPERIENCE TIGHTNESS IN THE
CHEST, BREATHLESSNESS AND LOSS OF CONSCIOUSNESS. TREMORS, CONVULSIONS
AND DEATH DUE TO RESPIRATORY PARALYSIS OR CIRCULATORY COLLAPSE CAN
OCCUR IN A FEW MINUTES TO SEVERAL HOURS FOLLOWING SEVERE EXPOSURES.
ASPIRATION OF SMALL AMOUNTS OF LIQUID IMMEDIATELY CAUSES PULMONARY
EDEMA AND HEMORRHAGE OF PULMONARY TISSUE. DIRECT SKIN CONTACT MAY
CAUSE ERYTHEMA. REPEATED OR PROLONGED SKIN CONTACT MAY RESULT IN
DRYING, SCALING DERMATITIS OR DEVELOPMENT OF SECONDARY SKIN
INFECTIONS. THE CHIEF TARGET ORGAN IS THE HEMATOPOIETIC SYSTEM.
BLEEDING FROM THE NOSE, GUMS OR MUCOUS MEMBRANES AND THE DEVELOPMENT
OF PURPURIC SPOTS (SMALL BRUISES), PANCYTOPENIA, LEUKOPENIA,
THROMBOCYTOPENIA, APLASTIC ANEMIA AND LEUKEMIA MAY OCCUR AS THE
CONDITION PROGRESSES. THE BONE MARROW MAY APPEAR NORMAL, APLASTIC OR
HYPERPLASTIC, AND MAY NOT CORRELATE WITH PERIPHERAL BLOOD-FORMING
TISSUES. THE ONSET OF EFFECTS OF PROLONGED BENZENE EXPOSURE MAY BE
DELAYED FOR MANY MONTHS OR YEARS AFTER THE ACTUAL EXPOSURE HAS CEASED.

----- PHYSICAL DATA -----

MELTING POINT: 5 C

BOILING POINT: 80 C

SPECIFIC GRAVITY: 0.874

VAPOR DENSITY: 2.77

VAPOR PRESSURE: 166.0 MM @ 37.7 C

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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE: 3

CATALOG # 27070-9

NAME: BENZENE, 99.9+%, HPLC GRADE

----- FIRE AND EXPLOSION HAZARD DATA -----

LOWER EXPLOSION LEVEL: 1.2%

UPPER EXPLOSION LEVEL: 8%

FLASH POINT: 12 F

EXTINGUISHING MEDIA

CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

WATER MAY BE EFFECTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO

PREVENT CONTACT WITH SKIN AND EYES.

USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.

UNUSUAL FIRE AND EXPLOSION HAZARDS

ANGER!

EXTREMELY FLAMMABLE.

VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND

FLASH BACK.

CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

----- REACTIVITY DATA -----

INCOMPATIBILITIES

OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

TOXIC FUMES OF:

CARBON MONOXIDE, CARBON DIOXIDE

----- SPILL OR LEAK PROCEDURES -----

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

EVACUATE AREA.

SHUT OFF ALL SOURCES OF IGNITION.

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY

RUBBER GLOVES.

COVER WITH AN ACTIVATED CARBON ADSORBENT, TAKE UP AND PLACE IN CLOSED

CONTAINERS. TRANSPORT OUTDOORS.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

WASTE DISPOSAL METHOD

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND

SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY

FLAMMABLE.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT

GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.

SAFETY SHOWER AND EYE BATH.

USE ONLY IN A CHEMICAL FUME HOOD.

USE NONSPARKING TOOLS.

DO NOT BREATHE VAPOR.

DO NOT GET IN EYES, ON SKIN, ON CLOTHING.

AVOID PROLONGED OR REPEATED EXPOSURE.

WASH THOROUGHLY AFTER HANDLING.

CARCINOGEN.

IRRITANT.

MUTAGEN.

KEEP TIGHTLY CLOSED.

KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.

STORE IN A COOL DRY PLACE.

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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE: 4

CATALOG # 27070-9

NAME: BENZENE, 99.9+%, HPLC GRADE

----- ADDITIONAL PRECAUTIONS AND COMMENTS -----

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CHEMTREC
1-800-424-9300

SUBSTANCE IDENTIFICATION

SUBSTANCE: AIR, COMPRESSED

TRADE NAMES/SYNONYMS:
AIR; UN 1002; MG100480

CHEMICAL FAMILY:
Mixture, gaseous

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=O REACTIVITY=O PERSISTENCE=O
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=O REACTIVITY=O

COMPONENTS AND CONTAMINANTS

COMPONENT: AIR, COMPRESSED

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
No occupational exposure limits established by OSHA, ACGIH, or NIOSH.

PHYSICAL DATA

DESCRIPTION: Bluish, mobile liquid or colorless gas.

BOILING POINT: -318 F (-194 C) SPECIFIC GRAVITY: 1.29 g/L @ 0 C

VAPOR PRESSURE: 760 mmHg @ -194 C SOLUBILITY IN WATER: slightly soluble

VAPOR DENSITY: 1.0

VISCOSITY: 0.01853 cP @ 26.85 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
Negligible fire hazard when exposed to heat or flame.

FIREFIGHTING MEDIA:
Dry chemical or carbon dioxide
(1990 Emergency Response Guidebook, DOT P 5800.5).

For larger fires, use water spray, fog or regular foam
(1990 Emergency Response Guidebook, DOT P 5800.5).

FIREFIGHTING:
Move container from fire if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Some of these materials if spilled may evaporate leaving a flammable residue. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire (1990 Emergency Response Guidebook, DOT P 5800.5, Guide Page 12).

Use agent suitable for type of fire. Cool containers with flooding amounts of water apply from as far a distance as possible.

TRANSPORTATION DATA

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
Air, compressed-UN 1002

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
2.2 - Non-flammable compressed gas

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
Nonflammable gas

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.306
NON-BULK PACKAGING: 49 CFR 173.302
BULK PACKAGING: 49 CFR 173.302

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 75 kg
CARGO AIRCRAFT ONLY: 150 kg

TOXICITY

AIR, COMPRESSED:
CARCINOGEN STATUS: None.
ACUTE TOXICITY LEVEL: No data available.
TARGET EFFECTS: No data available.

HEALTH EFFECTS AND FIRST AID

INHALATION:

AIR:
ACUTE EXPOSURE- Inhalation of compressed air at greater than atmospheric pressure, without complete decompression may cause decompression sickness. Symptoms may include: Headache, vertigo, fatigue, vomiting, dyspnea, burning sensation in the chest, cough, pulmonary edema, cutaneous irritation, itching, mottling and edema, macular eruptions, visual defects, deafness, pain in muscles, tingling, numbness, weakness or paralysis of limbs, angina, hypotension, convulsions, unconsciousness, coma, and death. Aseptic bone necrosis may occur following even one successful compression/decompression. The nitrogen in air inhaled under

EYE PROTECTION:

For the gas form eye protection is not required but recommended. Where there is any possibility of contact with the liquid form, employee must wear splash-proof safety goggles and a faceshield to prevent contact with this substance. Contact lenses should not be worn.

Emergency wash facilities:

Where there is any possibility that an employee's eyes and/or skin may be exposed to the liquid form of this substance, the employer should provide an eye wash fountain and quick drench shower within the immediate work area for emergency use.

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CREATION DATE: 05/07/90 REVISION DATE: 01/15/94

-ADDITIONAL INFORMATION-

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PREPARATION DATE: OCT 6, '89
DATE SENT TO CUSTOMER.....: DEC 20, '89
INFORMATION PHONE NUMBER :
(609) 354-9200
CHEMTREC EMERGENCY NUMBER:
1-800-424-7300

NFPA HAZARD RATINGS

HEALTH: 1 FLAMMABILITY: 3
REACTIVITY : 0 SPECIAL HAZARDS..:

SECTION I - GENERAL INFORMATION

CATALOG NUMBER(S): AX0110 AX0115 AX0116 AX0118 AX0120
 AX0120S AX0125
CHEMICAL NAME.....: ACETONE
TRADE NAME.....: DIMETHYL KETONE; 2-PROPANONE
C.A.S. NUMBER.....: 67-64-1
CHEMICAL FAMILY...: KETONE
FORMULA.....: CH₃COCH₃
MOLECULAR WEIGHT..: 58.08
DOT SHIPPING NAME: ACETONE
DOT NUMBER.....: UN1090

SECTION II - HAZARDOUS INGREDIENTS

ACETONE MAY CONTAIN TRACE AMOUNT OF BENZENE (LESS THAN 0.002%).
BENZENE (CAS# 71-43-2) HAS BEEN FOUND TO CAUSE CANCER.
NOTIFICATION OF CARCINOGENIC INGREDIENTS IN QUANTITY LESS THAN
0.1% IS NOT REQUIRED UNDER FEDERAL HAZARD COMMUNICATION LAW.

SECTION III- PHYSICAL DATA

BOILING POINT (C 760 MM HG)..: 56C
MELTING POINT (C).....: - 94C
SPECIFIC GRAVITY(H₂O = 1).....: 0.7905
VAPOR PRESSURE..(MM HG).....: 184 20C
PERCENT VOLATILE BY VOL (%)..: 99.9+
VAPOR DENSITY (AIR=1).....: 2.0
EVAPORATION RATE (BUAC=1).....: 14.48

MSDS-AX0110 PAGE # : 01

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SOLUBILITY IN WATER (%): MISCIBLE
APPEARANCE AND ODOR: COLORLESS LIQUID; PUNGENT ODOR.

SECTION IV - FIRE & EXPLOSION HAZARD DATA

FLASH POINT (F): OF (C)
FLAMMABLE LIMITS LEL %: 2.6
FLAMMABLE LIMITS UEL %: 12.8
EXTINGUISHING MEDIA:
DRY CHEMICAL, "ALCOHOL" FOAM, WATER SPRAY, CO.2..
USE WATER SPRAY TO COOL EXPOSED CONTAINERS
FIRE FIGHTING PROC.:
WEAR SELF-CONTAINED BREATHING APPARATUS.

FIRE & EXPL. HAZARDS:

DANGEROUS FIRE AND EXPLOSION HAZARD.
VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCE AND FLASH BACK.
HOT ORGANIC CHEMICAL VAPORS OR MISTS ARE SUSCEPTIBLE TO SUDDEN SPONTANEOUS COMBUSTION WHEN MIXED WITH AIR. IGNITION MAY OCCUR AT TEMPERATURES BELOW PUBLISHED AUTOIGNITION OR IGNITION TEMPERATURES. IGNITION TEMPERATURES DECREASE WITH INCREASING VAPOR VOLUME AND VAPOR/AIR CONTACT TIME AND ARE INFLUENCED BY PRESSURE CHANGES. IGNITION MAY OCCUR AT TYPICAL ELEVATED TEMPERATURE PROCESS CONDITIONS, ESPECIALLY IN PROCESS OPERATING UNDER VACUUM IF SUBJECTED TO SUDDEN INGRESS OF AIR, OR OUTSIDE PROCESS EQUIPMENT OPERATING UNDER ELEVATED PRESSURE IF SUDDEN ESCAPE OF VAPORS OR MISTS TO THE ATMOSPHERE OCCURS.

SECTION V - HEALTH HAZARD DATA (ACUTE AND CHRONIC)

ACGIH TLV/CSHA PEL (TWA): 750 PPM; STEL 1000 PPM
TOXICITY DATA:

BRL-RAT LD50: 5800 MG/KG
IHL-HMN TCLD: 500 PPM

SYMPTOMS OF EXPOSURE:

HARMFUL IF INHALED OR SWALLOWED.
HIGH CONCENTRATIONS OR PROLONGED EXPOSURE CAUSES HEADACHE, DIZZINESS, NAUSEA, IRRITATION OF EYES AND RESPIRATORY TRACT, NARCOSIS AND EVENTUALLY UNCONSCIOUSNESS.
MAY CAUSE DAMAGE TO CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS.
PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE IRRITATION.
EYE CONTACT CAUSES IRRITATION.
ANIMAL STUDIES SHOW ADVERSE EFFECTS ON FERTILITY WHEN FEMALES WERE EXPOSED CHRONICALLY DURING PREGNANCY.
MEDICAL COND. AGGRAVATED BY EXP: SKIN CONDITIONS, PREGNANCY.
ROUTES OF ENTRY: INHALATION, INGESTION OR SKIN CONTACT.
CARCINOGENICITY:

THE MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS CANCER CAUSING AGENT.
MAY CONTAIN TRACE AMOUNT OF BENZENE (SEE SECTION TWO).
EMERGENCY FIRST AID.....:

GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE

SKIN: WASH THOROUGHLY WITH SOAP AND WATER

EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES

INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF
BREATHING HAS STOPPED

INGESTION: IF CONSCIOUS, DRINK WATER AND INDUCE VOMITING IMMEDIATELY
AS DIRECTED BY MEDICAL PERSONNEL. NEVER GIVE ANYTHING BY
MOUTH TO AN UNCONSCIOUS PERSON.

REMOVE CONTAMINATED CLOTHING AND WASH BEFORE REUSE.

SECTION VI - REACTIVITY DATA

STABILITY.....: YES

CONDITIONS TO AVOID: HEAT, CONTACT WITH IGNITION SOURCE

MATERIALS TO AVOID.....: () WATER (X) ACIDS () BASES

() CORROSIVES (X) OXIDIZERS

(X) OTHER: POTASSIUM T-BUTOXIDE; NITRIC AND SULFURIC ACID MIXTURE,
BROMINE, CHLORINE

HAZARDOUS POLYMERIZATION.: DOES NOT OCCUR.

HAZARDOUS DECOMPOSITION...: CO.X.

SECTION VII - ENVIRONMENTAL PROTECTION PROCEDURES

SPILL RESPONSE:

-DIKE SPILL; TAKE UP WITH ADSORBENT; CONTAINERIZE FOR PROPER DISPOSAL
WASTE DISPOSAL: TO BE PERFORMED IN COMPLIANCE WITH ALL CURRENT LOCAL,
STATE AND FEDERAL REGULATIONS.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION:

RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR
ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH/MSHA APPROVED
AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER
ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER
NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED
CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING
AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE
EXPOSURE.

MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME
HOOD OR WITH ADEQUATE VENTILATION

PROTECTIVE GLOVES (NITYL RUBBER, CPE, POLYURETHANE OR EQUIVALENT)
SHOULD BE WORN TO PREVENT SKIN CONTACT
SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES

SECTION IX - SPECIAL PRECAUTIONS

HANDLING & STORAGE

KEEP CONTAINER CLOSED
STORE IN A COOL AREA AWAY FROM IGNITION SOURCES AND OXIDIZERS
DO NOT BREATHE VAPOR
DO NOT GET IN EYES
AVOID PROLONGED OR REPEATED SKIN CONTACT
ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT
RETAINED RESIDUE MAY MAKE EMPTY CONTAINERS HAZARDOUS; USE CAUTION!
WORK/HYGIENIC PRACTICES: WASH THOROUGHLY AFTER HANDLING. DO NOT TAKE
INTERNALLY. EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

SECTION X - OTHER INFORMATION

COMMENTS.....:

TESTS ON LABORATORY ANIMALS INDICATE MATERIAL MAY PRODUCE ADVERSE
MUTAGENIC AND REPRODUCTIVE EFFECTS.

REVISION HISTORY.....: 8/26/81, 7/01/83, 6/84, 6/85, 9/12/86, 6/5/87,
3/28/87, 10/27/87, 3/21/89

N/A = NOT AVAILABLE:

"SDS-AX0110

PAGE # : 04

"ISSUED 12/14/91"

Material Safety Data Sheet

from Genium's Reference Collection
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No. 23

CADMIUM

(Revision C)

Issued: September 1977

Revised: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: CADMIUM

Description (Origin/Uses): Used in electroplating other metals; in dentistry; in alloys; in nickel-cadmium batteries; and in reactor control rods.

Other Designations: Cd; CAS No. 7440-43-9

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.



Genium

HMS

H 3

R 1

F 1

I 4

R 0

S 1

PPG*

*See sect. 8 K 4 (Dust)

SECTION 2. INGREDIENTS AND HAZARDS, EXPOSURE LIMITS

Cadmium, CAS No. 7440-43-9, ca 100%
OSHA PEL

8-Hr TWA: 0.1 mg/m³ (Cd Fume)

Ceiling: 0.3 mg/m³ (Cd Fume)

8-Hr TWA: 0.2 mg/m³ (Cd Dust)

Ceiling: 0.6 mg/m³ (Cd Dust)

ACGIH NIC,* 1988-89

TLV-TWA: 0.01 mg/m³ (Cadmium and Compounds, as Cd)

ACGIH A2, Suspected Human Carcinogen

ACGIH TLVs, 1988-89

TLV-TWA: 0.05 mg/m³ (Cadmium Dusts and Salts, as Cd)

TLV-Ceiling: 0.05 mg/m³ (Cadmium Oxide Fume, as Cd)

TLV-TWA: 0.05 mg/m³ (Cadmium Oxide Production)

Toxicity Data**

Human, Inhalation, LC₅₀: 39 mg/m³ (20 Minutes)

*Notice of Intended Changes, Genium reference 116, p. 39.

**See NIOSH, RTECS (EU9800000), for additional data referring to reproductive, tumorigenic, and mutagenic effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 1413°F (767°C)

Melting Point: 610°F (321°C)

Vapor Pressure: 0.095 Torr at 610°F (321°C)

Molecular Weight: 112 Grams/Mole

Solubility in Water (%): Insoluble

Specific Gravity (H₂O = 1): 8.642

Appearance and Odor: A soft, blue white, malleable, lustrous metal that can be cut easily with a knife; odorless.

Comments: Cadmium has a significant vapor pressure of 0.000021 torr (corresponding to 0.12 mg/m³) at 315°F (157°C). Heating this metal without using correct engineering controls and/or personal protective equipment can result in overexposure.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method*

Autoignition Temperature*

LEL*

UEL*

Extinguishing Media: *Cadmium metal burns readily in air if it is heated. As with most metals, the reactivity/dust-cloud-explosion hazard increases as the cadmium metal becomes more finely divided. In fact, finely divided, powdered cadmium metal can be pyrophoric (it burns spontaneously in air without any source of ignition). Carbon dioxide, dry chemical, or sand are recommended extinguishing agents for cadmium fires. Unusual Fire or Explosion Hazards: Cadmium dust can explode during a fire. Massive cadmium metal does not present this potential explosion hazard; however, certain work operations such as grinding, welding, or cutting, can produce dust made of finely divided cadmium particles. Warning: Do not create a dust cloud of cadmium particles, especially during cutting, grinding, or welding operations. Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Cadmium is stable in closed containers during routine operations. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Cadmium reacts dangerously with ammonium nitrate, hydrazoic acid, tellurium, and zinc (Genium ref. 84).

Conditions to Avoid: Avoid all exposure to sources of ignition and to incompatible chemicals. Hazardous Products of Decomposition: When heated, which is likely during fires and work operations such as welding and machining, cadmium metal can decompose into cadmium metal fume and cadmium oxide fume.

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: The ACGIH classifies cadmium and its compounds as suspected human carcinogens (group A2); the IARC lists them as probable human carcinogens (group 2B); and the NTP classifies them as anticipated human carcinogens (group b). Summary of Risks: Heating cadmium metal produces intensely irritating cadmium metal fume. The acute effects of its excessive inhalation, which include severe tracheobronchitis, pneumonitis, and pulmonary edema, are life threatening and are usually delayed for several hours; their mortality rate is about 20%. Nonfatal pneumonitis has resulted from exposure to 0.5 to 2.5 mg/m³; a fatality has been reported for five hours' exposure at 9 mg/m³ and for 1 hour's exposure at 40 to 50 mg/m³. There is no warning discomfort or immediate irritation from exposure to cadmium fume. Acute gastroenteritis and symptoms of metal fume fever are associated with even lower acute exposure. Symptoms of acute overexposure include excessive salivation, a dry, burning throat; headache; aching muscles; coughing; chest tightness and pain; nausea; chills, and fever chills; and fever. Medical Conditions Aggravated by Long-Term Exposure: None reported. Target Organs: Skin, eyes, respiratory system, kidneys, and blood. Primary Entry: Inhalation, skin contact. Acute Effects: See Summary of Risks, above. Chronic Effects: Long-term, chronic inhalation of cadmium dust, salts, or fume causes chronic cadmium poisoning characterized by a distinctive, nonhypertrophic emphysema with or without renal tubular injury, accompanied by the urinary excretion of a protein with a molecular weight

SECTION 6. HEALTH HAZARD INFORMATION, cont.

of 20,000 to 30,000. This protein is itself a sign of early but reversible chronic poisoning. (Possible chromosomal aberrations and decreased birth weight among babies of women exposed to cadmium have been noted.) **Danger:** Continued overexposure from inhalation causes irreversible renal tubular damage. Cancer, anemia, eosinophilia, anosmia, chronic rhinitis, yellowed teeth, and bone changes have been reported. Bone pain in the ribs, backbone, and femur is common; disorders of calcium metabolism develop; and kidney stones and pulmonary fibrosis have been described. **FIRST AID:** Eyes. Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 minutes. Skin. Rinse the affected area with flooding amounts of water, then wash it with soap and water. Inhalation. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. Ingestion. If a physician is not readily available, give the exposed person 2 to 3 glasses of water to drink and induce vomiting. A physician may administer a gastric lavage followed by saline catharsis. **Comments:** A comprehensive medical program is advised for those who work with cadmium or its compounds. This should include chest X rays and forced-vital-capacity tests. Get medical help (in plant, paramedic, community) for all exposures. Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** Chelation therapy may be useful in treatment; calcium disodium edetate and penicillamine are recommended. Dimercaprol (BAL) is not recommended because of reported renal toxicity of the cadmium-BAL complex.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, evacuate unnecessary personnel, eliminate all sources of ignition immediately, and provide adequate ventilation. Cleanup procedures must not create dusty conditions. Pick up the spilled material using vacuuming, mopping, or wet-sweeping techniques. Cleanup personnel need protection against inhalation of dust and fume (see sect. 8). **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations. Concentrated solutions of cadmium waste can be precipitated with lime and collected by filtration. Effluent should be treated as needed to reduce the concentration of the cadmium to a level that is within regulatory compliance limits.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. D006 (40 CFR 261.24 [Characteristic of EP toxicity])

CERCLA Hazardous Substance, Reportable Quantity: 1 lb (0.454 kg), per the Clean Water Act (CWA), § 307 (a).

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of a cadmium solution is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Use a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, to prevent prolonged or repeated skin contact with this material. **Ventilation:** Install and operate general and local maximum explosion-proof ventilation systems powerful enough to maintain airborne levels of cadmium below the OSHA PEL cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. Do not wear work clothes home. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale cadmium fume. Do not expose individuals with lung, liver, kidney, and blood ailments to cadmium until such exposure is approved by a physician.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store cadmium in closed containers in a cool, dry, well-ventilated area away from sources of ignition and strong oxidizers. Protect containers from physical damage. Avoid storage situations where corrosion can occur. Keep powdered cadmium in closed containers; prevent the airborne dispersion of powdered cadmium. **Engineering Controls:** Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. Ground and bond all containers, pipelines, etc., used in shipping, transferring, reacting, producing, and sampling operations to prevent static sparks. **Other Precautions:** The toxic effects of cadmium are influenced by the presence or absence of other elements such as zinc and selenium. If these materials are present in the workplace, careful evaluation of any exposure to cadmium is required to understand any contributing factors.

Hazardous Materials Table (49 CFR 172.101): Not Listed

Optional Hazardous Materials Table (49 CFR 172.102)

ID No. UN2570

IMO Shipping Name: Cadmium Compounds

IMO Hazard Class: 6.1

IMO Labels: Poison or Saint Andrew's Cross (X)*

*Harmful—Saw away from Foodstuffs (IMO Label, Materials of Class 6.1 Packaging Group III).

References: 1, 26, 38, 84-94, 100, 116, 117, 120, 122.

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Material Safety Data Sheet

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No. 38
LEAD MONOXIDE
(Revision B)
Issued: November 1979
Revised: February 1986

SECTION 1. MATERIAL IDENTIFICATION

19

MATERIAL NAME: LEAD MONOXIDE

OTHER DESIGNATIONS: Lead (II) Oxide, Plumbous Oxide, Litharge, Massicot, PbO, CAS # 1317-36-8

MANUFACTURER/SUPPLIERS: Available from several suppliers, including:

NL Baroid, Inc., PO Box 1675, Houston, TX 77251; Telephone: (713) 527-1100

Eagle-Picher Industries, Inc., Chemicals Division, 580 Walnut Street, Cincinnati, OH 45202;

Telephone: (513) 721-7010

HMIS

Not Found

H: 2

F: 0

R: 0

PPE: *

* See Sect. 8

R 0

I 4

S 0

K 0

SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

LEAD MONOXIDE, PbO

>99

ACGIH TLV*: 8-hr TWA:
0.15 mg/m³

OSHA PEL**: 8-hr TWA:
0.05 mg/m³

Rat, Intraperitoneal,
LDLo: 430 mg/kg

Dog, Oral, LDLo:
1400 mg/kg

* Current (1985-86) ACGIH TLV, as Pb

** Current OSHA PEL (as Pb) with an action level of 0.03 mg/m³
(29 CFR 1910.1025)

SECTION 3. PHYSICAL DATA

Melting Point ... 1646.6°F(897°C) (Begins to Sublime before Melting)

Boiling Point ... 2681.6°F(1472°C) (Decomposes)

Molecular Weight ... 223.2

| | Litharge | Massicot |
|------------------------------|------------|------------|
| Density | 9.53 g/cc | 9.6 g/cc |
| Solubility in Water (@ 25°C) | 0.0504 g/L | 0.1065 g/L |

Appearance and odor: Lead monoxide exists in two crystalline forms: litharge and massicot. The reddish litharge transforms to yellow massicot at 912.2°F(489°C). Lead monoxide is odorless.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

NA

NA

NA

This material is nonflammable. Use whatever extinguishing agents are appropriate for the surrounding fire.

When hot, lead monoxide can act as an oxidizing agent and may intensify combustion.

Toxic dust and fumes may be generated in a fire situation. Fire fighters should wear self-contained breathing apparatus and full protective gear.

SECTION 5. REACTIVITY DATA

Lead monoxide is stable at room temperature. It does not polymerize. When heated and cooled in air it can undergo transitions between crystalline and oxide forms.

Mixtures of lead oxide and chlorinated rubber may react violently when heated. A lead oxide-glycerol mixture (used as cement/jointing compound) can ignite when exposed to fluorine gas and may explode after exposure to perchloric acid fumes. Violent reactions can occur when lead monoxide is heated with aluminum, sodium, zirconium, titanium, boron, or silicon. Other incompatibles include hydrogen trisulfide, metal acetylides, and peroxyformic acid.

Toxic lead fumes can form at high temperatures.

SECTION 6. HEALTH HAZARD INFORMATION | TLV

Lead compounds are toxic when inhaled or ingested. Lead is a cumulative poison. The chief effects of excessive lead intake are anemia, neurological disorders, and kidney damage. Symptoms of the neurological effects may include irritability, headaches, insomnia, delirium, convulsions, muscular tremors, and palsy of the extremities. Excessive lead exposure may also have adverse effects on human reproduction. Symptoms of acute lead poisoning by ingestion include headache; abdominal pain; nausea; vomiting; diarrhea; and, in severe cases, coma and death.

The IARC concludes that the evidence for carcinogenicity of lead and lead compounds to humans is inadequate. The NTP does not list lead monoxide in its third annual report on carcinogens.

FIRST AID: Any worker who experiences symptoms of lead poisoning should be removed from exposure and receive prompt medical care. **EYE CONTACT:** Flush eyes (including under the eyelids) with running water for at least 15 minutes. Obtain medical attention. **SKIN CONTACT:** Flush affected area with plenty of water. If irritation persists, seek medical attention. **INHALATION:** Remove victim from exposure. Get medical attention for treatment of symptoms. **INGESTION:** If person is conscious, give him/her plenty of milk or water to drink. Induce vomiting. Keep victim warm and at rest. Get medical assistance immediately.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety/environmental personnel of large spills. Ventilate spill area. Cleanup personnel should wear respiratory protection, gloves, and protective clothing. Carefully vacuum up spilled material. Place collected material in a suitable container that can be tightly sealed for reclaim or disposal. Avoid dusting conditions at all stages of handling.

DISPOSAL: Salvage material when possible. PbO requires disposal as a hazardous waste. Contact supplier or a licensed chemical waste disposal contractor for treatment, packaging, and disposal requirements. Follow Federal, state, and local regulations.

EPA Hazardous Waste No.: D008 (EP TOXIC; 40 CFR 261.24)

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide local exhaust ventilation and/or other engineering controls to meet the PEL requirement. NIOSH-approved respirators should be worn where engineering controls and work practices do not reduce exposures to or below the PEL. Half-mask air-purifying respirators with high-efficiency filters are acceptable for concentrations up to 0.5 mg/m³ (2.5 mg/m³ with full facepiece). Protective clothing and equipment such as coveralls, gloves, hats, and shoes should be worn when exposures exceed the PEL or where the possibility of skin and eye contact exist. Provide clean body-covering work clothing weekly to workers exposed to above the PEL (daily if exposed above 0.2 mg/m³) and arrange for special handling and laundering of contaminated clothing. Changing rooms (with separate storage facilities for street and work clothing) and showers are required for employees exposed to above the PEL. Prevent dust from being transported to lunchroom by way of the ventilation system or contaminated clothing. Consult the OSHA lead standard (29 CFR 1910.1025) for detailed requirements.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in tightly closed containers away from incompatibles. Protect containers from physical damage. Keep away from food or feed. Use good housekeeping procedures (vacuuming and/or wet cleanup) to prevent accumulation of dust. DO NOT use compressed air for cleaning surfaces or clothing (use vacuum). Follow good personal hygiene practice. Wash face and hands thoroughly after handling and before eating, drinking, or smoking. Do not eat, drink, or use tobacco in areas where this material is used.

Exposure monitoring, biological monitoring, and medical surveillance should be provided in accordance with the OSHA Lead Standard (29 CFR 1910.1025).

Prevent dust generation. Use with adequate ventilation. Avoid inhalation and contact. Do not ingest!

DOT Classification: Not listed in Hazardous Materials Table, 49 CFR 172.101.

Data Source(s) Code: 2, 4, 5, 12, 14, 25, 55, 57, 58, 61, 62, 82, 84, CV

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Approvals

Indust. Hygiene/Safety

Medical Review

MATERIAL SAFETY DATA SHEET

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No. 83

CHROMIUM METAL/POWDER

Date March 1981

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: CHROMIUM METAL/POWDER

OTHER DESIGNATIONS: Chrome, Cr, ASTM A481, CAS #007 440 473, GE Materials B10D1, B50T2005

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Chromium

>99

HAZARD DATA

8-hr TWA 1.0 mg/m³*

Rat, Intravenous
TDLo 2 mg/kg/6W-I
Neoplastic effects

Rat, Implant
TDLo 1 mg/kg/6W-I
Neoplastic effects

*Current OSHA standard for chromium metal and insoluble salt. ACGIH (1980) TLV Intended Changes List, 0.5 mg/m³

TLV set at a level to prevent pulmonary disease.

Status: Publication of a proposed regulation in summer of 1981 is anticipated. (BNA Reporter 12/11/80 pg 756)

SECTION III. PHYSICAL DATA

Boiling point, deg C ----- 2200

Specific gravity @ 20 C ----- 7.19

Vapor pressure, 1 mm Hg, deg C - 1616

Melting point, deg C ----- 1890

Vapor density (Air=1) ----- 1.79

Atomic weight ----- 52

Soluble in H₂O, g/100g ---- Insoluble

Appearance and Odor: Steel-gray, no odor.

SECTION IV. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temp. | Flammability Limits In Air | LOWER | UPPER |
|------------------------|--------------------|----------------------------|--------------------|-------|
| | 580 C* (cloud) | 400 C* (dust layer) | 0.230 | |
| | | Dust cloud explosion* | oz/ft ³ | |

Extinguishing Media: (Obtain detailed fire-fighting information from supplier.)

Powdered form is combustible. Use water spray or fog, dry chemical, CO₂, sand.

When powdered chromium is exposed to heat or ignition sources it is a moderate fire and explosive hazard. Index of explosibility (<.1 weak, >10 severe) 0.1. Particle size and dispersion in air determine reactivity.

Firefighters should wear self-contained breathing apparatus.

*100% of dust goes thru a 74 micron sieve. Can be ignited by a 140 millijoule spark.

SECTION V. REACTIVITY DATA

This metal is stable when properly stored and handled.
Reacts readily with dilute acids (not nitric) to form chromous salts. Soluble in acids (not nitric) and strong alkalis. Not oxidized by air, even in presence of noticeable moisture. Powder is incompatible with strong oxidizing agents, including high O₂ conc. Evaporation of Hg from Cr amalgam leaves pyrophoric chromium. Finely divided Cr attains incandescence with nitrogen oxide, potassium chlorate, sulfur dioxide.
Fused ammonium nitrate below 200 C reacts explosively; Cr dust (when heated) suspended in CO₂ is ignitable and explosive.
Molten lithium at 18 C attacks Cr severely. At high temperature, oxidation of metal may produce toxic chromium oxide fumes (See MSDS #5).

SECTION VI. HEALTH HAZARD INFORMATION

TLV (See Sect. II)

Chromium metal is relatively nontoxic. Inhalation hazard of powders is dependent upon particle size. Chromium metal and insoluble salts are said to be involved in histological fibrosis of the lungs. (Ref. 31). When metal is heated to a high temperature, fumes produced may be damaging to the lungs when inhaled (possible pneumoconiosis?). Dusts or powder can cause eye and skin irritation.

FIRST AID:

Eye Contact: Flush with running water for 15 minutes, including under eyelids.

Inhalation: Remove victim to fresh air. Restore and/or support breathing as required.

Ingestion: Give water to drink. Induce vomiting.

Seek prompt medical help for further treatment, support, and observation.

Skin: Brush off chromium dust. Wash well with soap and water.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of large spills. Remove sources of heat or ignition. Provide adequate ventilation. Keep airborne dust at a minimum. Clean up personnel to wear protective clothing and approved respirator. Remove spills quickly and place in appropriate containers for disposal or reuse.

DISPOSAL: Reclaim salvageable metal. Place waste in approved secure landfill.* Or incinerate with approved air pollution controls. Follow Federal, State, and Local regulations.

*California Class I.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements in the workplace. Respiratory protection (MESA/OSHA approved) equipment necessary for certain work situations. Respiratory protection in the form of a self-contained breathing apparatus with a full facepiece to be used when the particle concentration's upper limit is 50 mg/m³. Avoid eye contact by use of chemical safety goggles where dusty conditions occur. Wear protective clothing appropriate for the work situation to minimize skin contact. Clothing to be changed daily and laundered. Showering after work with a complete change to street clothing is desirable.

Eyewash stations should be readily accessible in areas of use of powdered chromium. Provide preplacement and periodic medical examinations for those regularly exposed to chromium dust or fume with emphasis on respiratory systems.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS (for chromium powder)

Store material in cool, dry, well-ventilated area. Away from heat or ignition sources. Use good housecleaning practices to prevent accumulation of dust and follow cleaning techniques (vacuuming and wet sweeping) that will keep airborne particulate at a minimum. Use nonsparking tools and ground electrical equipment and machinery. Avoid inhalation of dust. Minimize skin contact by using rubber gloves and aprons. Wash thoroughly after handling. Store separate from acids and oxidizing agents. Keep containers closed and protect from physical damage.

DATA SOURCE(S) CODE: 2-7,9-12,25,26,31,37-44

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APPROVALS: MIS
CRD

Industrial Hygiene
and Safety

MEDICAL REVIEW: 23 March 1981

Material Safety Data Sheet

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No. 683

POLYCHLORINATED BIPHENYLS
(PCBs)

Issued: November 1988

SECTION 1. MATERIAL IDENTIFICATION

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Material Name: POLYCHLORINATED BIPHENYLS (PCBs)



Genium

Description (Origin/Uses): Commercial PCBs are mixtures that were once widely manufactured by combining chlorine gas, iron filings, and biphenyls. Their high stability contributes to their intended commercial applications and their accidental, long-term adverse environmental and health effects. PCBs are useful as insulators in electrical equipment because they are electrically nonconductive. Their distribution has been limited since 1976. The Aroclor PCB codes identify PCBs by type. The first two digits of a code indicate whether the PCB contains chlorinated biphenyls (12), chlorinated terphenyls, (54), or both (25, 44); the last two digits indicate the approximate percentage of chlorine. Found in insulating liquid, synthetic rubber, plasticizers, flame retardants, floor tile, printer's ink, paper and fabric coatings, brake linings, paints, automobile body sealants, asphalt, adhesives, electrical capacitors, electrical transformers, vacuum pumps, gas-transmission turbines, heat-transfer fluids, hydraulic fluids, lubricating and cutting oil, copying paper, carbonless copying paper, and fluorescent light ballasts.

Synonym: Chlorodiphenyls

Other Designations (Producer, Trade Name, Nation): Monsanto, Aroclor® (USA, Great Britain); Bayer, Clophen® (German Democratic Republic); Prodelec, Phenoclor®, Pyralene® (France); Kanegafuchi, Kanechlor®; Mitsubishi, Santotherm® (Japan); Caffaro, Fenclor® (Italy).

| Trade Name | CAS No. | RTECS No. | Trade Name | CAS No. | RTECS No. |
|--------------|------------|-----------|--------------|------------|-----------|
| Aroclors | 01336-36-3 | TQ1350000 | Aroclor 1242 | 53469-21-9 | TQ1356000 |
| Aroclor 1016 | 12674-11-2 | TQ1351000 | Aroclor 1248 | 12672-29-6 | TQ1358000 |
| Aroclor 1221 | 11104-28-2 | TQ1352000 | Aroclor 1254 | 11097-69-1 | TQ1360000 |
| Aroclor 1232 | 11141-16-5 | TQ1354000 | Aroclor 1260 | 11096-82-5 | TQ1362000 |

HMS

| | | | |
|------|---|---|---|
| H | 1 | R | 1 |
| F | 1 | I | 3 |
| R | 0 | S | 1 |
| PPG* | | K | 1 |

SECTION 2. INGREDIENTS AND HAZARDS/EXPOSURE LIMITS

PCB-42% Chlorine/Aroclor 1242
CAS No. 53469-21-9
OSHA PEL (Skin*)
8-Hr TWA: 1 mg/m³
ACGIH TLV (Skin*), 1988-89
TLV-TWA: 1 mg/m³

PCB-54% Chlorine/Aroclor 1254
CAS No. 11097-69-1
OSHA PEL (Skin*)
8-Hr TWA: 0.5 mg/m³
ACGIH TLV (Skin*), 1988-89
TLV-TWA: 0.5 mg/m³

All PCBs/Aroclors
CAS No. 1336-36-3
NIOSH REL 1977
10-Hour TWA: 0.001mg/m³
Toxicity Data**
Mouse, Oral, LD₅₀: 1900 mg/kg

*This material can be absorbed through intact skin, which contributes to overall exposure.

**See NIOSH, RTECS (Genium ref. 90), at the locations specified in section 1 for additional data with references to tumorigenic, reproductive, mutagenic, and irritative effects.

SECTION 3. PHYSICAL DATA

Boiling Point: Ranges from 527°F (275°C) to 725°F (385°C)
Solubility in Water (%): Insoluble
Pour Point: Ranges from -31°F (-35°C) to 87.8°F (31°C)

% Volatile by Volume: Ranges from 1.2 to 1.6
Molecular Weight (Average): Aroclor 1242: 258 Grams/Mole
Aroclor 1254: 326 Grams/Mole

Appearance and Odor: Clear to light yellow mobile oil to a sticky resin; a sweet "aromatic" odor. As the percentage of chlorine increases, the PCB becomes thicker and heavier; e.g., Aroclor 1254 is more viscous than Aroclor 1242.

SECTION 4. FIRE AND EXPLOSION DATA

| | | | |
|--------------|-------------------------------------|----------------|----------------|
| Flash Point* | Autoignition Temperature: Not Found | LEL: Not Found | UEL: Not Found |
|--------------|-------------------------------------|----------------|----------------|

Extinguishing Media: Use water spray/fog, carbon dioxide (CO₂), dry chemical, or "alcohol" foam to extinguish fires that involve polychlorinated biphenyls. Although it is very difficult to ignite PCBs, they are often mixed with more flammable materials (oils, solvents, etc.)

Unusual Fire or Explosion Hazards: If a transformer containing PCBs is involved in a fire, its owner may be required to report the incident to appropriate authorities. Consult and follow all pertinent Federal, state, and local regulations. Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode; fire fighters must also wear a complete set of protective clothing. Comments: The hazards of PCB fires are associated with the possibility of their being released into the environment where they and their products of degeneration can pose serious long-term health risks. These potential problems are heightened by the PCBs' resistance to biological and chemical degradation and by the possibility that they will contaminate underground water systems (see sect. 5)

*Ranges from 284°F (140°C) to 392°F (200°C).

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Polychlorinated biphenyls are very stable materials. Hazardous polymerization cannot occur.

Chemical Incompatibilities: PCBs can react dangerously with sodium or potassium. These reactions are part of an industrial process used to destroy PCBs; however, people have been killed by explosions at PCB treatment, storage, and disposal sites. Conditions to Avoid: Limit human exposure to PCBs to the lowest possible level; especially avoid contact with skin. Hazardous Products of Decomposition: Thermal-oxidative degradation of PCBs can produce toxic gases such as carbon monoxide, chlorine, chlorinated aromatic fragments, phenolics, aldehydes, and hydrogen chloride. Incomplete combustion of PCBs produces toxic compounds such as polychlorinated dibenzofuran (PCDF, the major product of combustion), and polychlorinated dibenzo-p-dioxin (PCDD or dioxin).

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: The EPA lists PCBs as carcinogens, and the IARC classifies them as probable human carcinogens (group 2B).

Summary of Risks: Effects of accidental exposure to PCBs include acneform eruptions; eye discharge; swelling of the upper eyelids and hyperemia of the conjunctiva; hyperpigmentation of skin, nails, and mucous membrane; chloroacne; distinctive hair follicles; fever; hearing difficulties; limb spasms; headache; vomiting; and diarrhea. PCBs are potent liver toxins that can be absorbed through unbroken skin in hazardous amounts without immediately discernible pain or discomfort. Severe health effects can develop later. In experimental animals, prolonged or repeated exposure to PCBs by any route results in liver damage at levels that are less than those reported to have caused cancer in rodents. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** Skin, eyes, eyelids, blood, liver. **Primary Entry:** Inhalation, skin contact/absorption. **Acute Effects:** Skin and eye irritation, acneform dermatitis, nausea, vomiting, abdominal pain, jaundice, liver damage. **Chronic Effects:** Possible cancer (evidence of this is inconclusive); reproductive effects (jaundice, excessive secretion of tears, dermal chromopexy); and hepatitis. **FIRST AID:** Eyes. Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for 15 minutes. Skin. Rinse exposed skin with flooding amounts of water; wash with soap and water. Inhalation. Remove the exposed person to fresh air; restore and/or support breathing as needed. Have qualified medical personnel administer oxygen as required. Ingestion. Induce vomiting by sticking your finger to the back of the exposed person's throat. Have him or her drink 1 to 2 glasses of milk or water. Get medical help (in plant, paramedic, community) for all exposures. Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** PCBs are poorly metabolized, soluble in lipids, and they accumulate in tissues or organs rich in lipids. Liver function tests can help to determine the extent of body damage in exposed persons. If electrical equipment containing PCBs arcs over, the PCBs or other hydrocarbon dielectric fluids may decompose and give off hydrochloric acid (HCl), a potent respiratory irritant.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Treat any accidental release of PCBs as an emergency. An SPCCP (spill-prevention control and countermeasure plan) must be formulated before spills or leaks occur. PCBs are resistant to biodegradation, soluble in lipids, and chemically stable; as such they have become significant contaminants of global ecosystems. Releases of PCBs require immediate, competent, professional response from trained personnel. Each release situation is unique and requires a specifically designed cleanup response. General recommendations include adhering to Federal regulations (40 CFR Part 761). Notify safety personnel, evacuate nonessential personnel, ventilate the spill area, and contain the PCBs. All wastes, residues, and contaminated cleanup equipment from the incident are subject to EPA requirements (40 CFR 761). Consult your attorney or appropriate regulatory officials for information about reporting requirements and disposal procedures. **Waste Disposal:** Contact your hazardous waste disposal firm or a licensed contractor for detailed recommendations, especially when PCBs are unexpectedly discovered. Follow Federal, state, and local regulations. PCBs are biomagnified in the food chain; i.e., their concentration increases at each link. The disposal of PCBs or of PCB-contaminated materials is strictly regulated; violations of applicable laws can result in fines, lawsuits, and negative publicity. **Warning:** Accidental spills of PCBs that may affect water supplies must be reported to Coast Guard personnel at the National Response Center, telephone (202) 426-2675.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).

EPA Designations (40 CFR 302.4)

CERCLA Hazardous Substance, Reportable Quantity: 10 lbs (4.54 kg), per the Clean Water Act (CWA), §§ 311 (b) (4) and 307 (a).

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of PCBs is possible, wear a full face shield. Follow OSHA eye- and face-protections regulations (29 CFR 1910.133). **Respirator:** Wear a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (leaks or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will not protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent any contact of PCBs with your skin. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standards cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contamination into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do not wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. Heavily soiled clothing must be properly discarded in a manner consistent with applicable regulations. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do not eat, drink, or smoke in work areas.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage Segregation: Store PCBs in closed containers in a cool, dry, well-ventilated area. Protect containers from physical damage. **Special Handling/Storage:** All storage facilities must have adequate containment systems (dikes; elevated, nonporous holding platforms; retaining walls) to prevent any major release of PCBs into the environment. Carefully design and implement these extra precautions now; do not wait until you have to respond to an accidental release of this material.

Transportation Data (49 CFR 172.101-2; PCBs were the first materials to be directly regulated by Congress by way of TSCA in 1976.)

DOT Shipping Name: Polychlorinated Biphenyls

IMO Shipping Name: Polychlorinated Biphenyls

DOT Hazard Class: ORM-E

IMO Hazard Class: 9

ID No. UN 23115

IMDG Packaging Group: II

DOT Packaging Requirements: 49 CFR 173.510

References: 1, 6, 26, 38, 84-94, 100, 101, 116, 117, 120, 122.

Prepared by PJ Igoe, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: W Silverman, MD

Technical Review: Northeast Analytical, Inc. (PCB and VOC Specialists), Schenectady, New York, Telephone: (518) 346-4592

M A T E R I A L S A F E T Y D A T A S H E E T
EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
400 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE: OCT 6, '89
DATE SENT TO CUSTOMER.....: DEC 20, '89
INFORMATION PHONE NUMBER :
(609) 354-9200
CHEMTREC EMERGENCY NUMBER:
1-800-424-7300

NEPA HAZARD RATINGS

HEALTH: 1 FLAMMABILITY: 3
REACTIVITY : 0 SPECIAL HAZARDS..:

SECTION I - GENERAL INFORMATION

CATALOG NUMBER(S): AX0110 AX0115 AX0116 AX0118 AX0120
 AX0120S AX0125
CHEMICAL NAME.....: ACETONE
TRADE NAME.....: DIMETHYL KETONE; 2-PROPANONE
C.A.S. NUMBER.....: 67-64-1
CHEMICAL FAMILY...: KETONE
FORMULA.....: CH₃COCH₃.
MOLECULAR WEIGHT.: 58.08
DOT SHIPPING NAME: ACETONE
DOT NUMBER.....: UN1090

SECTION II - HAZARDOUS INGREDIENTS

ACETONE MAY CONTAIN TRACE AMOUNT OF BENZENE (LESS THAN 0.002%).
BENZENE (CAS# 71-43-2) HAS BEEN FOUND TO CAUSE CANCER.
NOTIFICATION OF CARCINOGENIC INGREDIENTS IN QUANTITY LESS THAN
0.1% IS NOT REQUIRED UNDER FEDERAL HAZARD COMMUNICATION LAW.

SECTION III- PHYSICAL DATA

BOILING POINT (C 760 MM HG): 56C
MELTING POINT (C).....: -94C
SPECIFIC GRAVITY(H₂O = 1).....: 0.7905
VAPOR PRESSURE..(MM HG).....: 184 20C
PERCENT VOLATILE BY VOL (%)...: 99.9+
VAPOR DENSITY (AIR=1).....: 2.0
EVAPORATION RATE (E₁₀₀=1).....: 14.48

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THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DISCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

SOLUBILITY IN WATER (%):.....: MISCIBLE
APPEARANCE AND ODOR:.....: COLORLESS LIQUID; PUNGENT ODOR.

SECTION IV - FIRE & EXPLOSION HAZARD DATA

FLASH POINT (F):.....: OF (C):

FLAMMABLE LIMITS LEL %: 2.6

FLAMMABLE LIMITS UEL %: 12.9

EXTINGUISHING MEDIA:.....:

DRY CHEMICAL, "ALCOHOL" FOAM, WATER SPRAY, CO.2..

USE WATER SPRAY TO COOL EXPOSED CONTAINERS

FIRE FIGHTING PROC:.....:

WEAR SELF-CONTAINED BREATHING APPARATUS.

FIRE & EXPL. HAZARDS:.....:

DANGEROUS FIRE AND EXPLOSION HAZARD.

VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCE AND FLASH BACK.

HOT ORGANIC CHEMICAL VAPORS OR MISTS ARE SUSCEPTIBLE TO SUDDEN SPONTANEOUS COMBUSTION WHEN MIXED WITH AIR. IGNITION MAY OCCUR AT TEMPERATURES BELOW PUBLISHED AUTOIGNITION OR IGNITION TEMPERATURES. IGNITION TEMPERATURES DECREASE WITH INCREASING VAPOR VOLUME AND VAPOR/AIR CONTACT TIME AND ARE INFLUENCED BY PRESSURE CHANGES. IGNITION MAY OCCUR AT TYPICAL ELEVATED TEMPERATURE PROCESS CONDITIONS, ESPECIALLY IN PROCESS OPERATING UNDER VACUUM IF SUBJECTED TO SUDDEN INGRESS OF AIR, OR OUTSIDE PROCESS EQUIPMENT OPERATING UNDER ELEVATED PRESSURE IF SUDDEN ESCAPE OF VAPORS OR MISTS TO THE ATMOSPHERE OCCURS.

SECTION V - HEALTH HAZARD DATA (ACUTE AND CHRONIC)

ACGIH TLV/CSHA PEL (TWA):.....: 150 PPM; STEL 1000 PPM

TOXICITY DATA:.....:

BRL-RAT LD50: 5800 MG/KG

IHL-HMN TCLO: 500 PPM

SYMPTOMS OF EXPOSURE :.....:

HARMFUL IF INHALED OR SWALLOWED.

HIGH CONCENTRATIONS OR PROLONGED EXPOSURE CAUSES HEADACHE, DIZZINESS, NAUSEA, IRRITATION OF EYES AND RESPIRATORY TRACT, NARCOSIS AND EVENTUALLY UNCONSCIOUSNESS.

MAY CAUSE DAMAGE TO CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS.

PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE IRRITATION.

EYE CONTACT CAUSES IRRITATION.

ANIMAL STUDIES SHOW ADVERSE EFFECTS ON FERTILITY WHEN FEMALES WERE EXPOSED CHRONICALLY DURING PREGNANCY.

MEDICAL COND. AGGRAVATED BY EXP: SKIN CONDITIONS, PREGNANCY.

ROUTES OF ENTRY:.....: INHALATION, INGESTION OR SKIN CONTACT.

CARCINOGENICITY:.....:

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THE MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS CANCER CAUSING AGENT.
MAY CONTAIN TRACE AMOUNT OF BENZENE (SEE SECTION TWO).

EMERGENCY FIRST AID.....:

GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE

SKIN: WASH THOROUGHLY WITH SOAP AND WATER

EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES

INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF
BREATHING HAS STOPPED

INGESTION: IF CONSCIOUS, DRINK WATER AND INDUCE VOMITING IMMEDIATELY
AS DIRECTED BY MEDICAL PERSONNEL. NEVER GIVE ANYTHING BY
MOUTH TO AN UNCONSCIOUS PERSON.

REMOVE CONTAMINATED CLOTHING AND WASH BEFORE REUSE.

SECTION VI - REACTIVITY DATA

STABILITY.....: YES

CONDITIONS TO AVOID: HEAT, CONTACT WITH IGNITION SOURCE

MATERIALS TO AVOID.....: () WATER (X) ACIDS () BASES

() CORROSIVES (X) OXIDIZERS

(X) OTHER: POTASSIUM T-BUTOXIDE; NITRIC AND SULFURIC ACID MIXTURE,
BROMINE, CHLORINE

HAZARDOUS POLYMERIZATION.: DOES NOT OCCUR.

HAZARDOUS DECOMPOSITION...: CO.X.

SECTION VII - ENVIRONMENTAL PROTECTION PROCEDURES

SPILL RESPONSE:

-DIKE SPILL; TAKE UP WITH ABSORBENT; CONTAINERIZE FOR PROPER DISPOSAL
WASTE DISPOSAL: TO BE PERFORMED IN COMPLIANCE WITH ALL CURRENT LOCAL,
STATE AND FEDERAL REGULATIONS.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION:

RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR
ANY COMPONENT IS EXCEEDED (SEE TLV/REL), A NIOSH/MSHA APPROVED
AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER
ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER
NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED
CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING
AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE
EXPOSURE.

MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME
HOOD OR WITH ADEQUATE VENTILATION

PROTECTIVE GLOVES (NITYL RUBBER, CPE, POLYURETHANE OR EQUIVALENT)
SHOULD BE WORN TO PREVENT SKIN CONTACT
SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES

SECTION IX - SPECIAL PRECAUTIONS

HANDLING & STORAGE

KEEP CONTAINER CLOSED
STORE IN A COOL AREA AWAY FROM IGNITION SOURCES AND OXIDIZERS
DO NOT BREATHE VAPOR
DO NOT GET IN EYES
AVOID PROLONGED OR REPEATED SKIN CONTACT
ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT
RETAINED RESIDUE MAY MAKE EMPTY CONTAINERS HAZARDOUS; USE CAUTION!
WORK/HYGIENIC PRACTICES: WASH THOROUGHLY AFTER HANDLING. DO NOT TAKE
INTERNALLY. EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

SECTION X - OTHER INFORMATION

COMMENTS.....:

TESTS ON LABORATORY ANIMALS INDICATE MATERIAL MAY PRODUCE ADVERSE
MUTAGENIC AND REPRODUCTIVE EFFECTS.

REVISION HISTORY.....: 8/26/81, 7/01/83, 6/84, 5/85, 9/12/86, 6/5/87,
3/28/87, 10/27/87, 3/21/89

N/A = NOT AVAILABLE:

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